

Rock Products

TRADEPRESS PUBLISHING CORPORATION
542 SOUTH DEARBORN STREET
CHICAGO

NATHAN C. ROCKWOOD, Editor CHAS. H. FULLER, Manager CHAS. A. BRESKIN, Assistant Editor

Vol. XXIII, No. 14

July 3, 1920

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Applicant for Membership in Audit Bureau of Circulations
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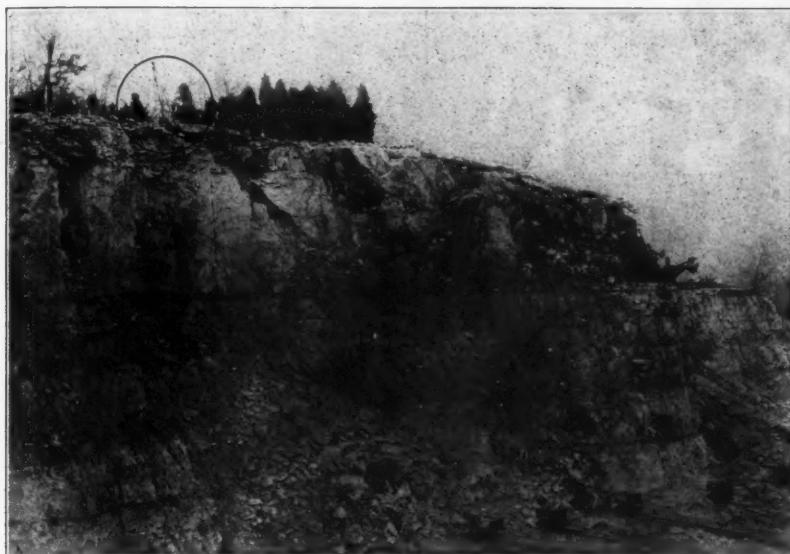
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A Pioneer Big Blast Hole Drill Installation in a Southern Lime Plant

**Eleven Years of Successful Drilling and
Blasting by The Gager Lime and Mfg. Co.**

EARLY in 1909 the Gager Lime and Manufacturing Co. of Chattanooga tried out, with a small well drill, the big hole method of drilling and blasting, which was then in its experimental stages. So successful and economical were the results that some time later a Cyclone No. 14 Special Big Blast Hole Drill of the gasoline traction type was purchased.

The No. 14 Machine had just been placed on the market and was a product developed by the new system of quarry operation. It was a machine designed to withstand the severe, every-day-of-the-year punishment to which a quarry drilling outfit must submit, and after several years of experience had taught that the ordinary well drill did not have the stamina for this class of work. Even today the No. 14 is the only drilling machine designed and built exclusively for blast hole work.

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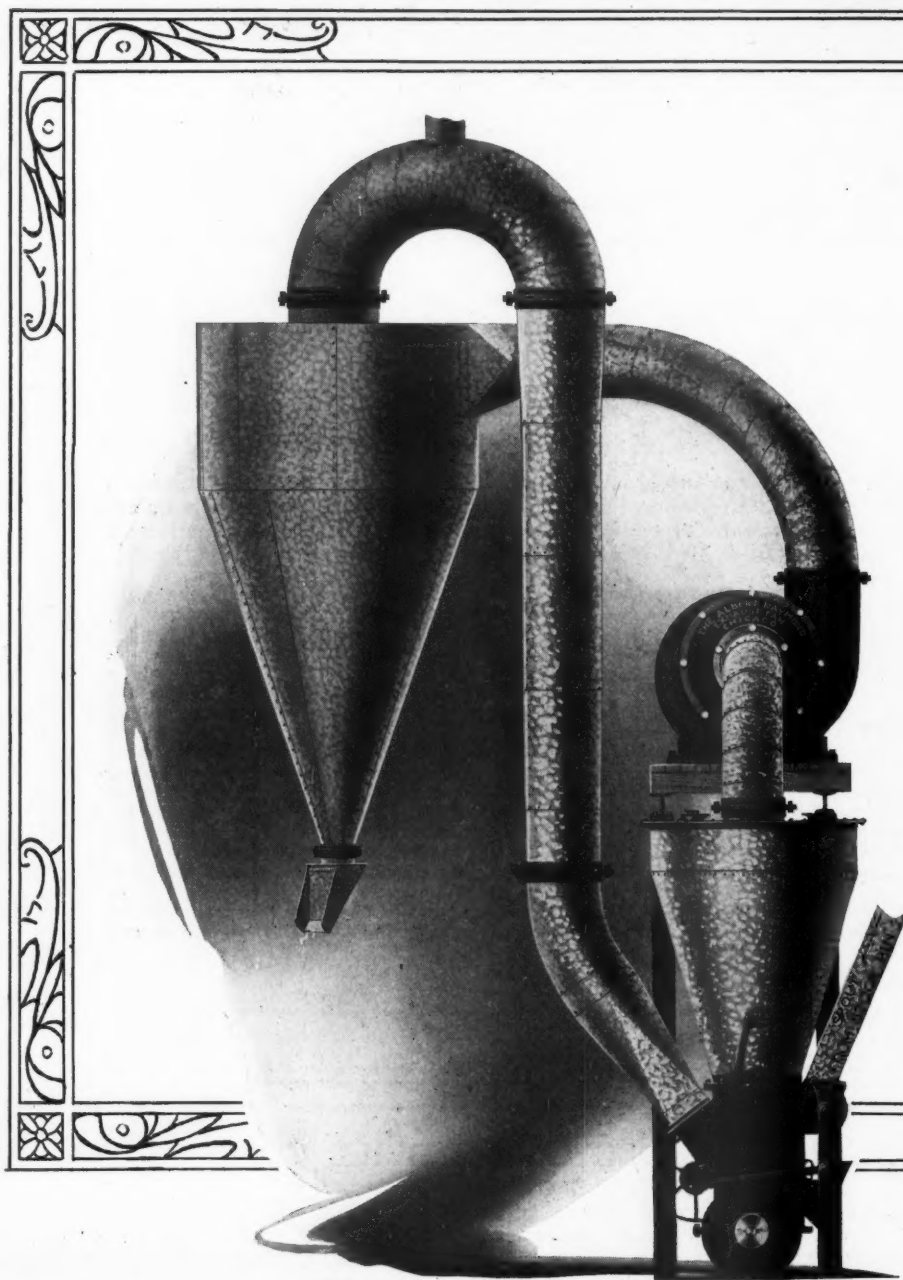
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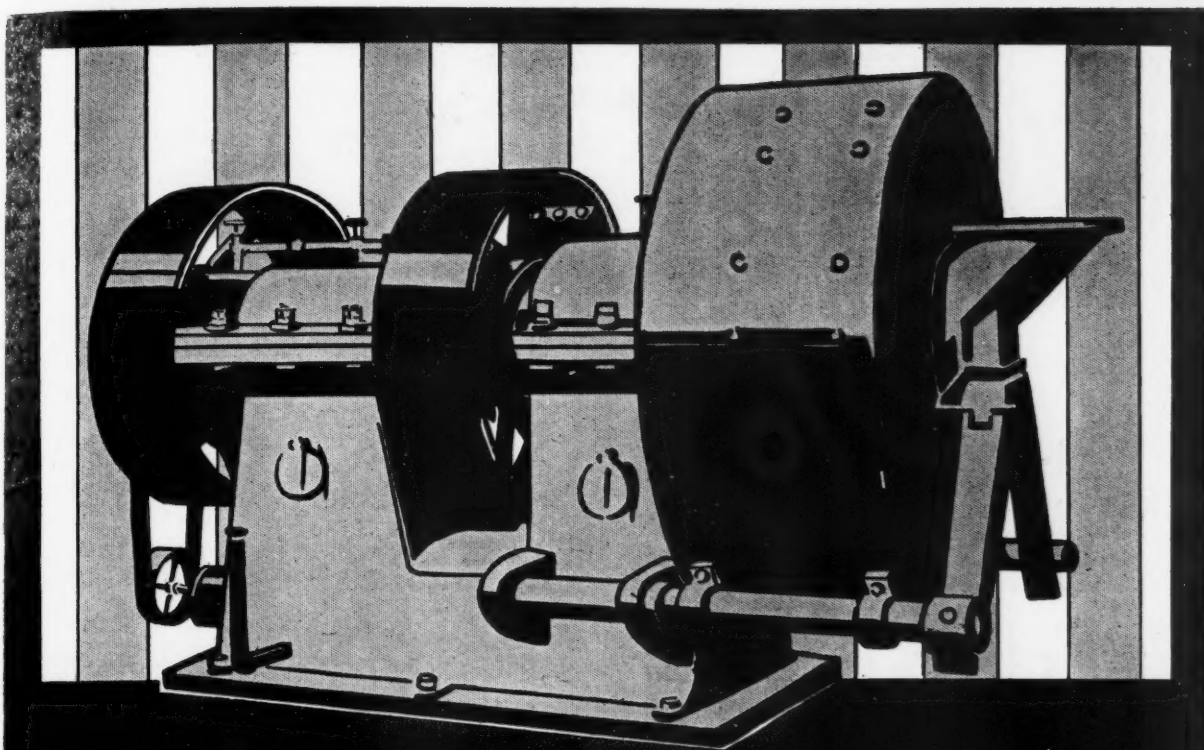
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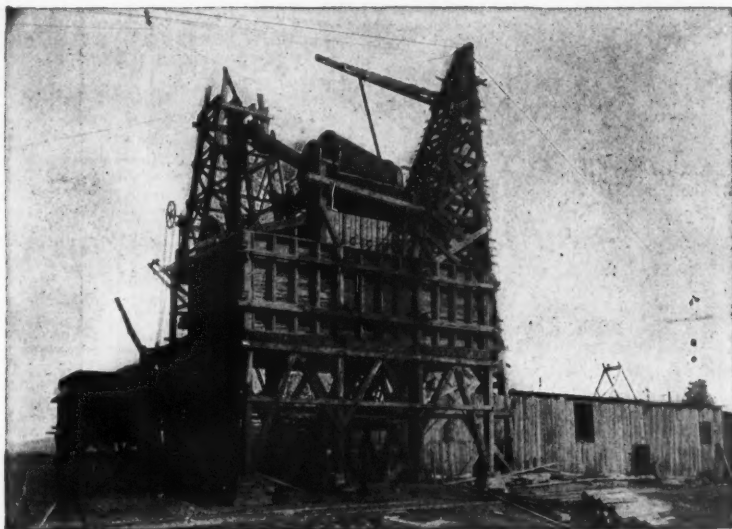
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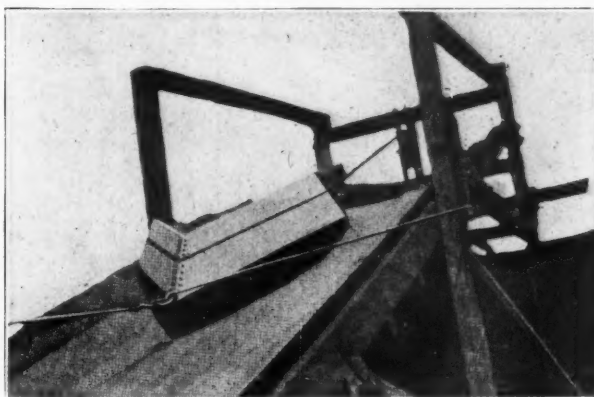
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For Delivery to Plant, Stripping, Storing, Loading Cars or Wagons



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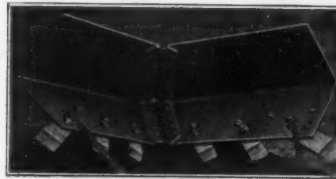
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Read What a User Says About It

Dear Sir:—"Just one year ago we undertook the use of your scraper, and from a decided skeptic we have become an enthusiast. It works perfectly in our material, sand and gravel, and gives perfect satisfaction whether the material is dry or dragged from the creek. We had been advised for years that we could not use a drag line on our work and secure satisfactory results. Of this I am convinced had I used any other make of scraper, and this is said without any criticism of other makes. The lightness of your scraper, its durability, the ease and certainty with which it leads, together with the way it glides along the surface after it is loaded, places it, in our judgment, in a class by itself. Once loaded, it will not sink, even in passing over ground so soft that it will not support a man, and this feature has been very valuable to us when removing material from the creek. The scraper is all I have said of it and more."

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Top and bottom alike—when one side is worn it can be reversed—double length of service.

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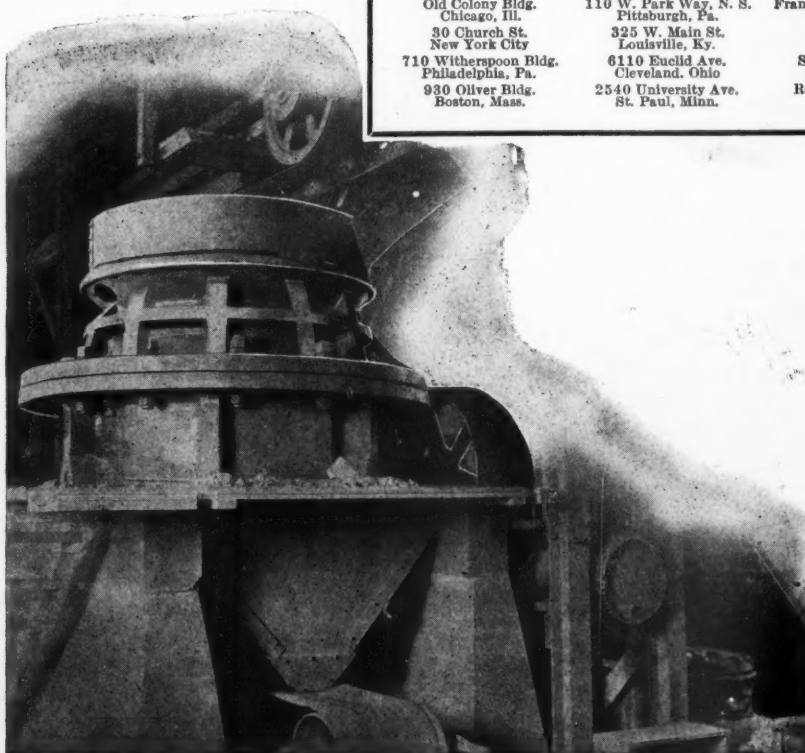
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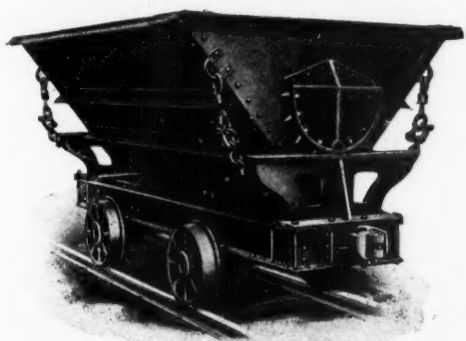
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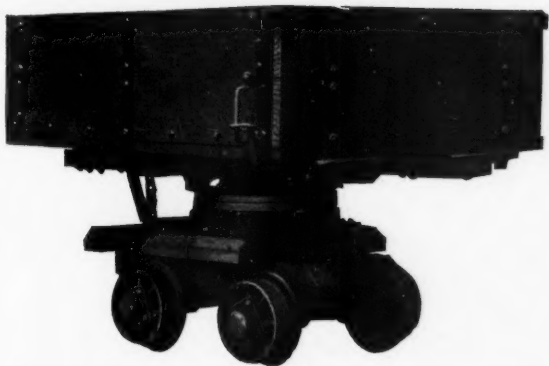


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That's what our engineers do—design exactly the car to meet the requirements of your work—the car that is the most economical for you to maintain, to operate—not the “hit-or-miss-ready-made cars.”

All we do is build cars—every type of cars—and the fact that we are the largest pit and quarry car builders in the world is the most convincing proof we know that our cars are best.

If you have a real problem, don't fail to call on us. We have helped others, why not you?



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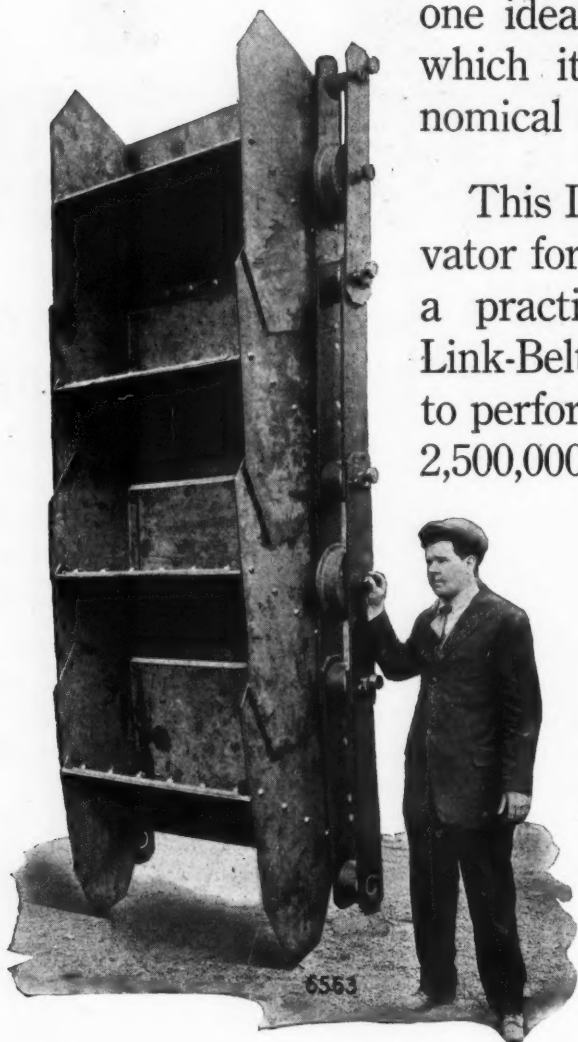
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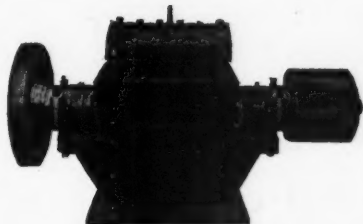
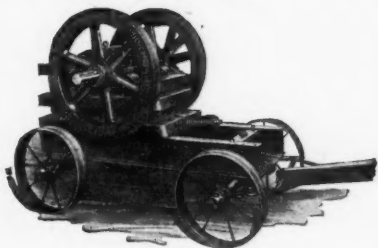
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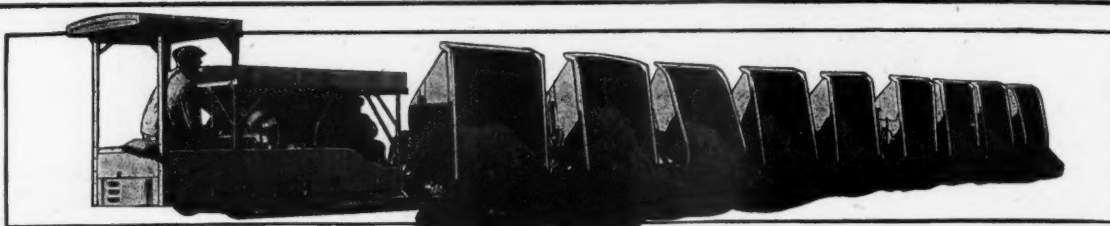
Pulverize it for Agricultural Limestone—sell it at a good profit. Big demand for Agricultural Limestone in every farming community. Use GRUENDLER CRUSHERS and PULVERIZERS. They are specially adapted for pulverizing Limestone for fertilizing purposes; will increase your profits by increasing your production approximately 50 per cent.

GRUENDLER CRUSHERS are simple, rugged, correct in design, give greater capacity per horsepower, last indefinitely, and are practically free from interruption of operation. They deliver service, unfailingly, economically, continuously.

GRUENDLER
SLEDGE HAMMER PULVERIZERS

Write for bulletin and full particulars

Gruendler Patent Crusher & Pulverizer Co.
987 North Main Street St. Louis, Mo.



TEAM WORK_____

The PLYMOUTH pulls for the owner, and the owner pulls for the PLYMOUTH. That is the the kind of TEAM work that has made the rugged PLYMOUTH the Color Bearer



Moved 700 Tons with 7 Gallons of Gas

"Our two PLYMOUTHS give first-class results," writes F. J. Quilter, Secretary and Superintendent of The Brokensword Stone Company, Bucyrus, Ohio.

Each PLYMOUTH hauled 700 tons a day over a half mile track, using a gallon of gasoline per 100 tons. That's why Mr. Quilter added:

"We consider the PLYMOUTH the best Industrial Locomotive on the market."

Tell us about your Haulage Problem and we will mail Illustrated Bulletin covering your needs.

The Fate-Root-Heath Company

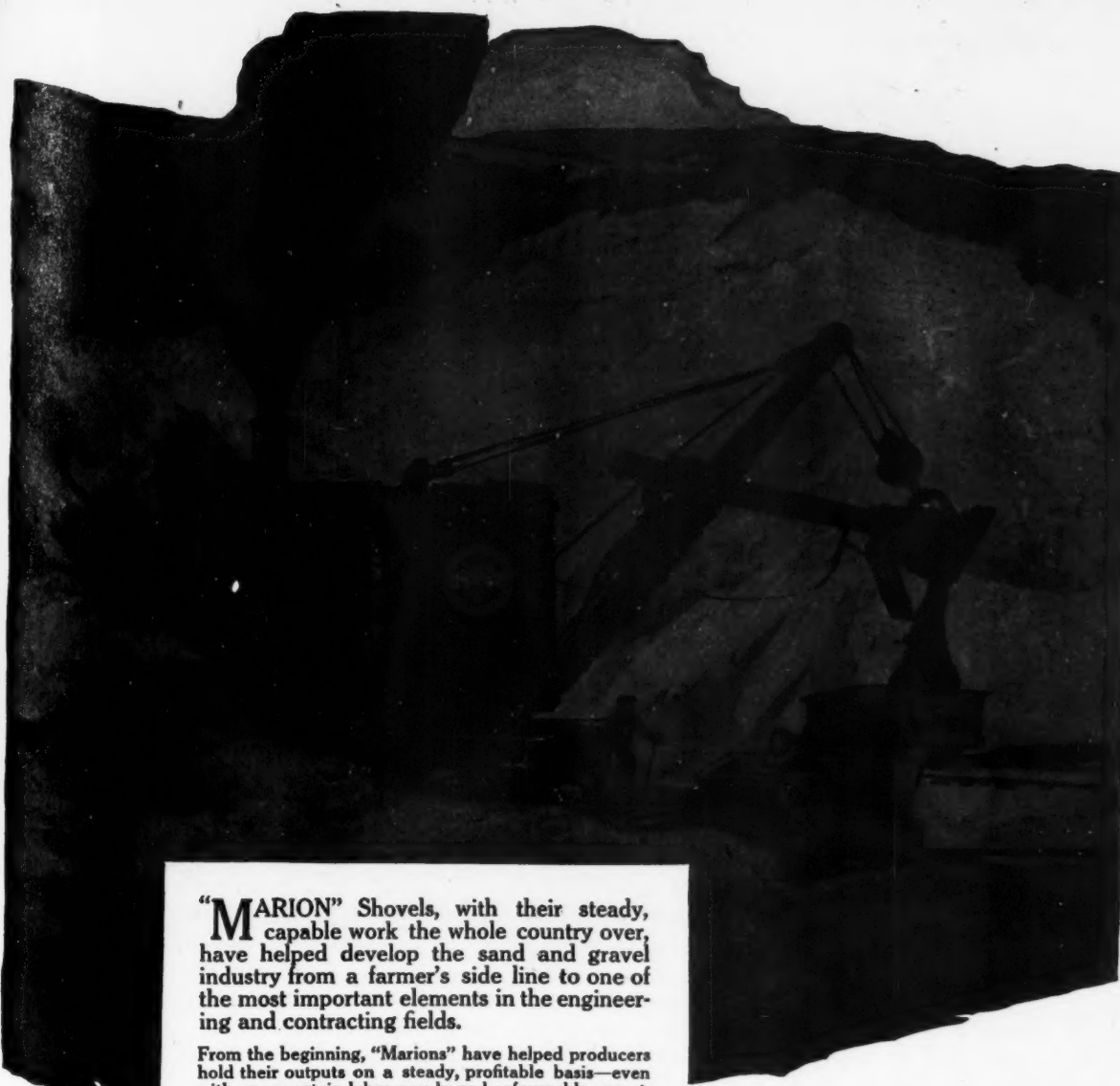
210 Riggs Ave.

Plymouth, Ohio

PLYMOUTH

Gasoline Locomotives

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"MARION" Shovels, with their steady, capable work the whole country over, have helped develop the sand and gravel industry from a farmer's side line to one of the most important elements in the engineering and contracting fields.

From the beginning, "Marions" have helped producers hold their outputs on a steady, profitable basis—even with an uncertain labor supply and unfavorable operating conditions. "Marion" Standard and Revolving Shovels are digging in hundreds of "dry" sand and gravel pits; "Marion" Draglines and Dredges are reclaiming big yardages each day in operations under water.

Put your work up to us. We'll gladly tell you, in detail, just what a "Marion" can do for you; what it will cost; and when we can ship. We are now building "Marions" of certain popular types in increased quantity and are advancing deliveries rapidly.

THE Marion STEAM SHOVEL CO.


ESTABLISHED 1884

Marion, Ohio

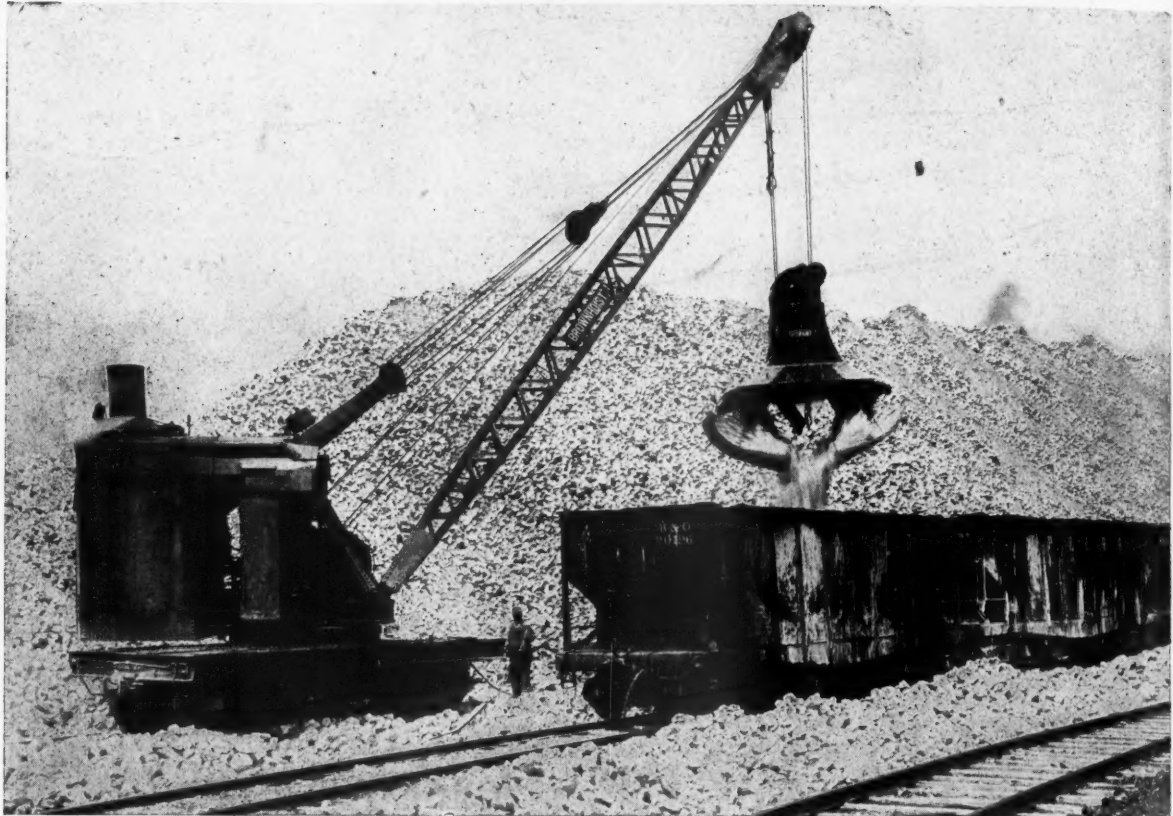
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Even lump limestone is handled rapidly

BROWNHOIST

Products Include:

Locomotive Cranes
Grab Buckets
Drag-Line Buckets
Electric Hoists
Tramrails and Trolleys
Overhead Tr. Cranes
Pillar and Jib Cranes
Heavy Dock Machinery
Suspended Concrete Bins

Write for Catalogs

This Brownhoist locomotive crane loads large lump limestone from storage into the railroad cars for shipment. The stone is received in large lumps, is very hard and, therefore, very difficult to handle. But the Brownhoist crane with Brownhoist bucket loads many 50-ton cars each day and quickly cuts its way into the pile containing thousands of tons.

Work on such a large scale would be impossible if handled by hand. But the Brownhoist with only one operator and a ground man not only does the loading but will switch the cars as well. This means that the cars can be moved whenever necessary, and without the use of a switching engine. Any way you consider it, the Brownhoist not only does the work better; it does it faster and much more economically as well.

If your handling costs are high, write for Catalog K, which shows Brownhoist locomotive cranes at many different kinds of work. It may give you an idea as to how best to solve your own handling problem.

The Brown Hoisting Machinery Company

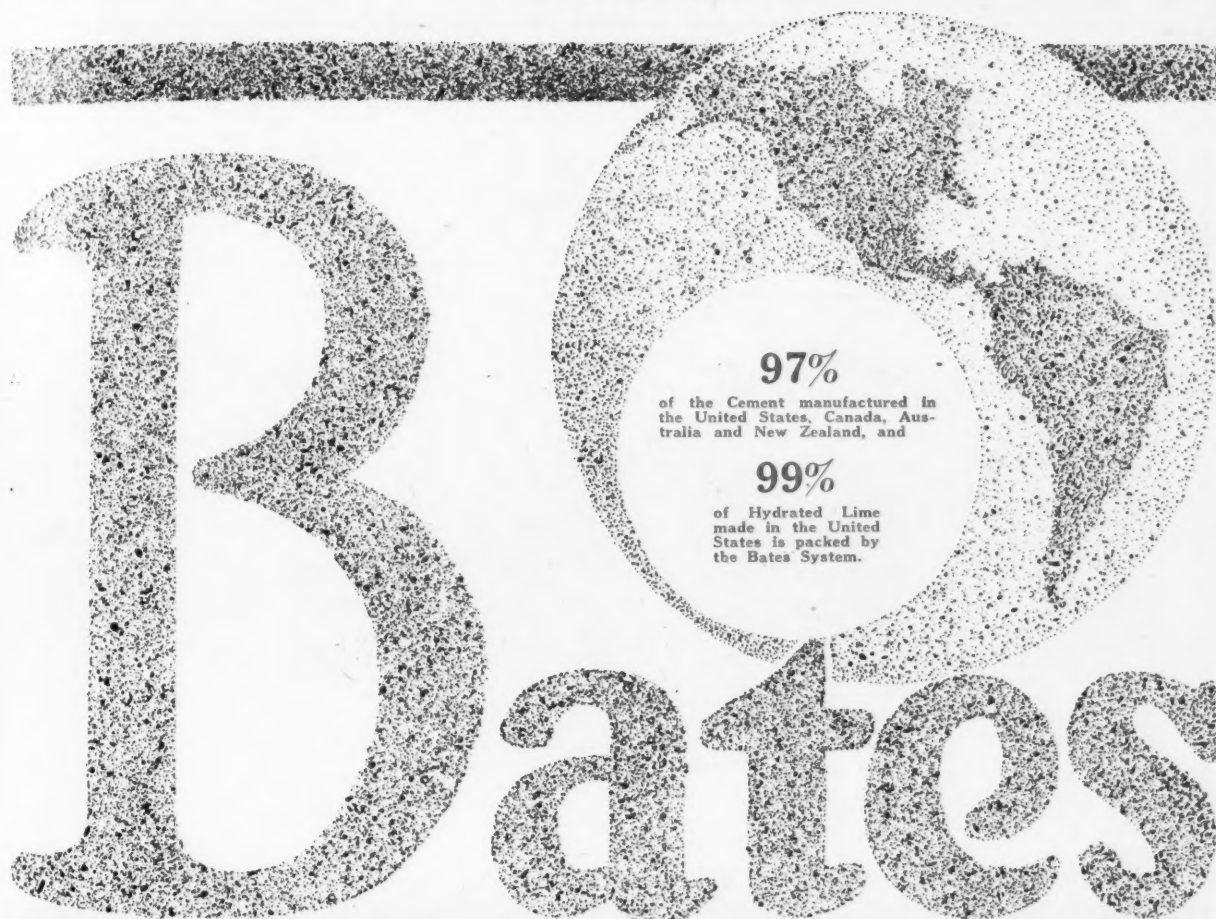
40 Years in Crane Business

Cleveland, Ohio, U. S. A.

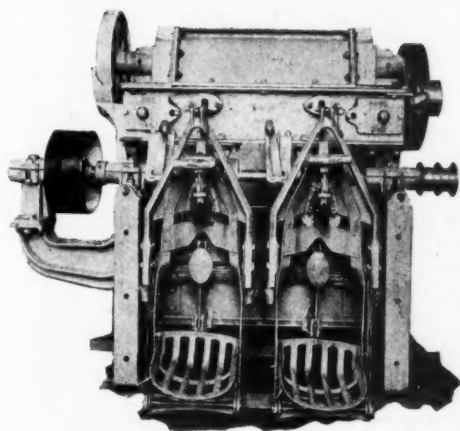
Engineers and Manufacturers of Heavy Dock Machinery, Bridge Cranes, etc., as well as smaller Cranes and Hoists.

Branch Offices in New York, Pittsburgh, Chicago and San Francisco. European Representative: H. E. Hayes, 12 Rue de Phalsbourg, Paris.

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AUTOMATIC BAG FILLING AND WEIGHING MACHINES



A triumph in bag-filling machinery considering results which are based solely on reduced labor, greater output and low cost.

That Bates Bag Filling Machines are accepted as standard is evidenced by their almost universal use.

Unequaled for packing pulverized limestone, ground phosphate, gypsum, stucco, cement, plaster, fullers earth, paint fillers and other rock products. Made in four sizes—single tube, two tube, three and four tube. Respective capacities are 75, 150, 225 and 300 tons per day. Write for catalog.

Bates Valve Bag Company

7310 South Chicago Avenue

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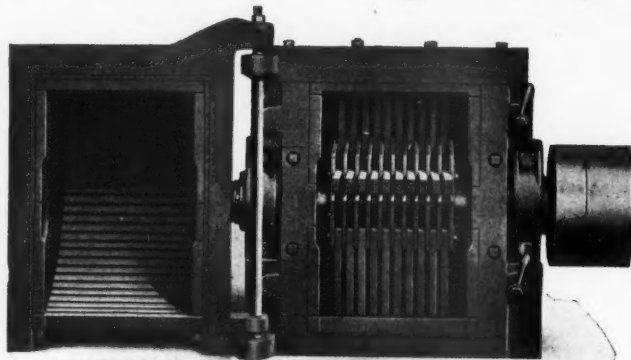


"ONE MAN - ONE MINUTE"



STURTEVANT "OPEN-DOOR" MACHINERY

"Open Door" Swing-Sledge Mill



PATENTED

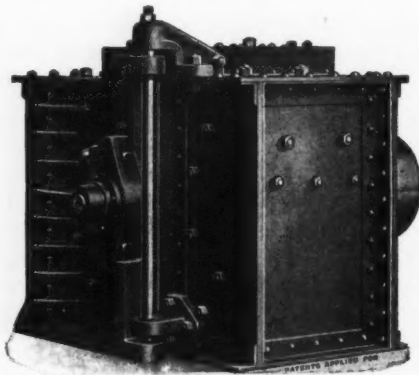
FOR PULVERIZING SOFT AND MODERATELY HARD MATERIALS

"ONE-MAN IN ONE-MINUTE" opens this massive door, through which every part may be reached for inspection, adjustment, repair, or for the removal of iron or other uncrushable substances.

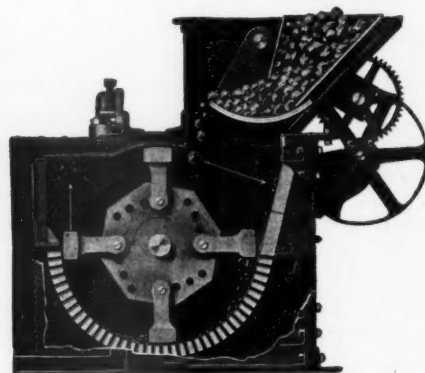
High-Speed Pulverizers produce enormous outputs if closely adjusted and kept in repair, otherwise production falls off rapidly.

To repair other mills of this type is a long and difficult undertaking and therefore is generally neglected, and the mills seldom give rated capacities.

There is no excuse for neglect with "OPEN-DOOR" mills, and therefore their outputs are always at maximum.



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STURTEVANT MILL CO., BOSTON MASS.
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"Keystone" Lime Kilns in Cuba



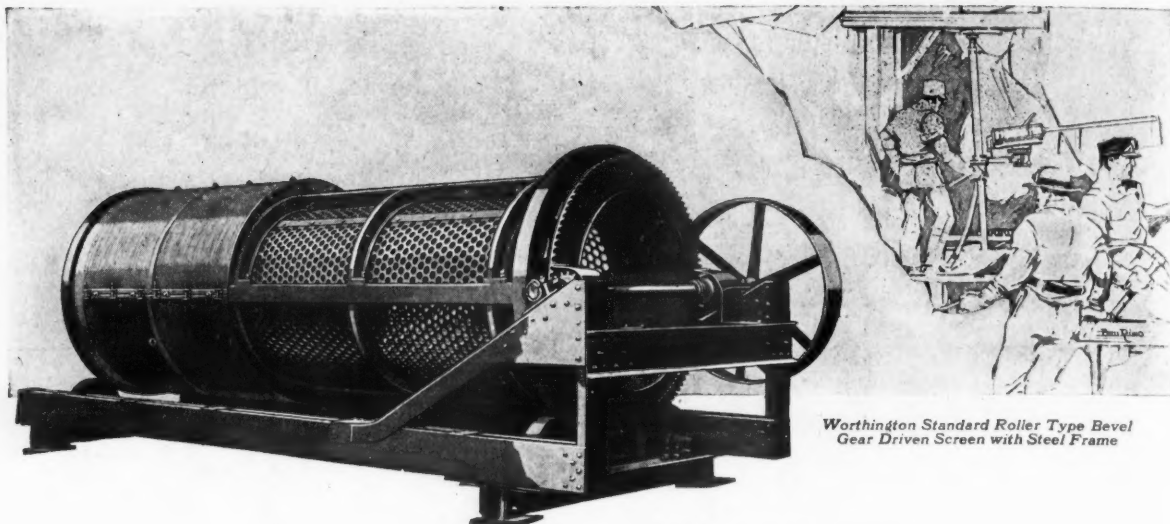
Successful operation of many Keystone Kilns in Cuba is striking endorsement of their unvarying, dependable service and adaptability to varying conditions of climate.

Our most exacting attention to details of construction result in uninterrupted and economical performance. Day after day this fact is proven by every one of the 245 Keystone Kilns in active use. A KEYSTONE will prove a key to unlock your lime burning problem.

Write us for details

Cable address, "Bromell York," ABC 5th Edition
Western Union

**Steady-Schmidt Mfg. Co.
YORK, PA.**



Worthington Standard Roller Type Bevel
Gear Driven Screen with Steel Frame

What Worthington have to offer you

SINCE proper selection and installation of machinery determine plant efficiency, Worthington maintain at their Power and Mining Works, Cudahy, Wis., a corps of engineering experts for your advice and help.

As companion apparatus to the Screen illustrated at the head of this page, Worthington build Superior McCully Gyratory Crushers, Superior Jaw Crushers, Rotary Kilns, Dryers, Coolers, Elevators, Tube Mills and Ball Compartment Mills. Many of these machines incorporate particular Worthington construction features as for instance, Superior McCully suspended short shaft and force-fed lubrication.

Then too, sponsoring these machines is the great, big Worthington organization since 1840 world's standard for pumps and pumping machinery.

Other Worthington Products

Gyratory Crushers, Jaw Crushers, Air Compressors, Mine Pumps, Revolving Stone Screens, Ball and Tube Mills.

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SCHAFFER LIME & CEMENT BULLETIN

VOLUME LXXIV NO. 110

JULY 1920

Improving Cement Blocks by Use of Hydrated Lime drawback and this results from the fact that the amount of lime used must be greater than the theoretical quantity

Improvements in Lime Process

More recent developments have shown

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Under the terms of the lease Mr. Ballin

Boston will receive all the material for six more miles of bituminous macadam being scheduled for construction.

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Schaffer Service

For years the Schaffer Engineering & Equipment Company has been serving the Lime Industry with a specific service that has established a high reputation for the products of this concern. Based, as it is, on the highest degree of engineering skill and knowledge, Schaffer Service has played a leading part in the development of modern practice in lime production and manufacture.

The success of any company engaged in the lime business fundamentally depends upon the correctness of plant design and equipment. Today it is acknowledged throughout the industry that Schaffer designed plants and equipment are successful from every standpoint.

Schaffer Service includes consulting engineering, and the manufacture of hydrators, poidometers, coal injectors, screens, and similar equipment.

The business has grown so rapidly and tremendously that better manufacturing facilities and assistance became necessary. These have been provided. Today this concern is equipped to handle any business connected with lime and cement production that comes to it and to deliver the utmost in satisfactory service to its clients and customers.

Put your problems up to us. We will assist you in providing quick and complete solution.

The Schaffer Engineering & Equipment Co.
Peoples Bank Building
Pittsburgh, Pa.

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Schaffer Lime & Cement Bulletin

New England Lime Manufacturers Organized

New Head of Chemical Bureau of Lime Association

chemical bureau of the National Lime Association, was noted in the October 25 issue of the Bulletin.

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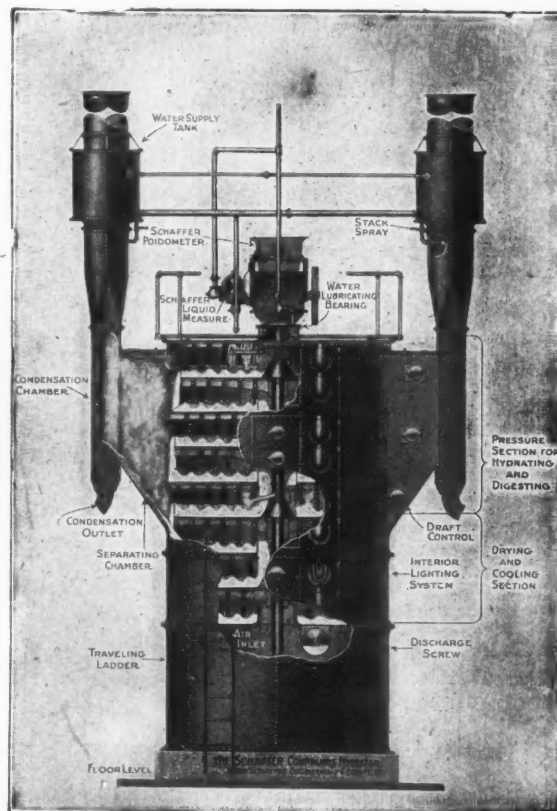
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A Machine That Wonderfully Co-ordinates The Essentials of Successful Hydrating



THE SCHAFER HYDRATOR

- Will operate continuously and automatically.
- Will produce a superior quality of finished product.
- Will operate with entire satisfaction on either high calcium or dolomitic limes.
- Will effect a greater saving in labor.
- Will permit of the greatest capacity on finishing mills.
- Will prevent re-crystallization of very quick limes.
- Will produce the greatest percentage of amorphous product.
- Will give flexibility in operation to meet any market conditions.
- Will properly co-ordinate with other working units of the plant.
- Will occupy less space, capacity considered.
- Will consume less power, capacity considered.
- Will produce a product superior to any competing machine or process.
- Will give satisfaction in every way.

THE SCHAFER ENGINEERING & EQUIPMENT CO.

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Schaffer Lime & Cement Bulletin

World's Greatest Lime Plant

Simple Chemical Process

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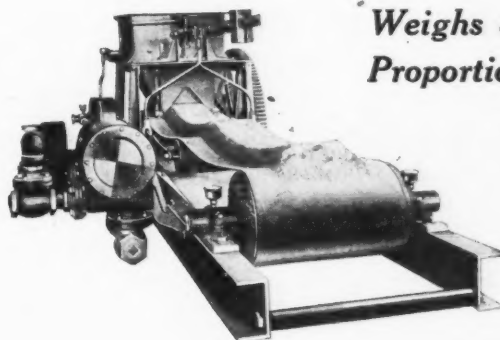
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*It
Weighs and
Proportions*

Schaffer Poidometer for Cement Mills and Lime Plants

A conveying-weigher that correctly measures and proportions raw materials—constant in operation—keeps its own record of performance. Absolutely automatic—thoroughly dependable—a watchman constantly on guard, guaranteeing a scientifically accurate handling of materials.

Write for Bulletin 5-A—it contains all the details

The Schaffer Engineering & Equipment Co.
Peoples Bank Building **Pittsburgh, Pa.**

Stone, Executive Secretary; Chicago
Sand and Gravel Producers Association.

values are about 2.5, 1.7 and 1.4 per cent. These tests do not bear out the common

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Schaffer Lime & Cement Bulletin

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"2. The bituminous coal held must be distributed only to those consumers who have no reserve supply and must have

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Announcement

It is with pleasure that we announce the Schaffer-Crow Furnace with Schaffer-Crow Coal Injectors for use in connection with rotary kilns. By the peculiar heat treatment arising from this distinctive and modern piece of apparatus we anticipate revolutionary heat treatments of all rotary kiln materials. We will have further information as to the actual commercial results to announce at a later date.



The Schaffer Engineering & Equipment Co.
Peoples Bank Building
Pittsburgh, Pa.

In an interview with A. G. Gutheim, member of the car service commission of

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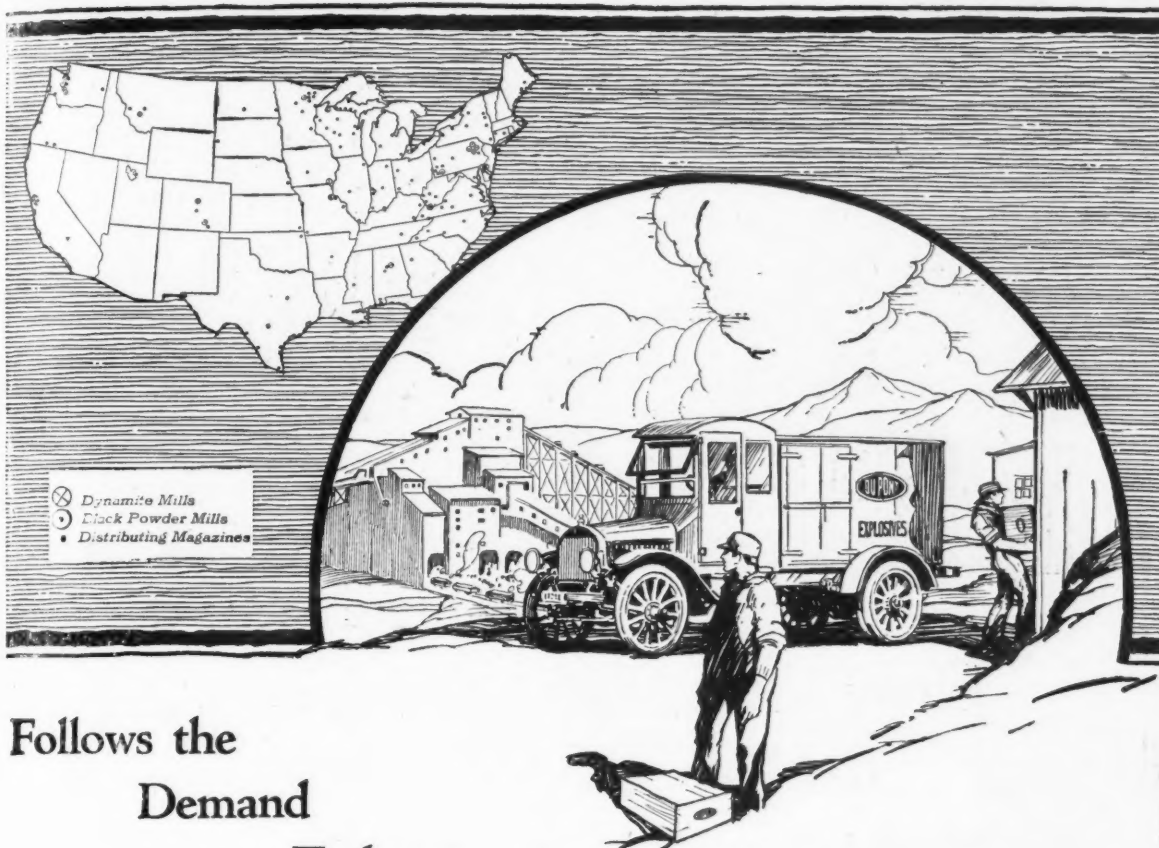
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Du Pont Explosives Service

—Everywhere



Follows the
Demand
Today—

DU PONT Service has followed the demand into every nook and by-way. Today, fleets of specially designed motor trucks feed the mines in many of the great coal and ore districts, just as the grocer delivers foodstuffs to the home. Twenty-four mills and hundreds of magazines, strategically located throughout the country, form the center of these radiating lines of service.

Du Pont Explosives Service has brought about better and more economical explosives, delivered *when* and *where* you want them—and close co-operation to the end that they are used more efficiently.

During the 118 years of this Company's existence, this Service has grown in its scope and value, aiding production and construction everywhere. It has been a distinct factor in the building of America. It stands today as a real achievement. It is yours for the asking.

Ask your dealer—or write us.

E. I. du Pont de Nemours & Company, Inc.

Sales Dept.: Explosives Division

WILMINGTON, DELAWARE



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Leviathan Slag Conveyor in Large Pennsylvania Plant—Replacing the Labor of 30 Men.

How One Plant Overcame the Scarcity of Men

BEFORE the labor shortage became acute, slag was handled at this plant by means of mule-drawn carts.

To cut down the number of men required, and also to speed up the work, this 165 foot 24" x 8 ply Leviathan Belt was installed.

Running 200 feet per minute it delivers no less than 165 tons of slag each hour up a considerable incline. Note the gravity-operated car dumping slag onto the belt through a hopper.

Some difficulty was experienced at first with the rollers used. They were replaced by standard Main Belting Company's Style "C" Rollers, and the wear on the belt materially reduced.

Only a belt with the remarkable stamina of the Leviathan could continuously handle this heavy daily tonnage of rough slag. The installation of this belt has released the services of thirty men to other and more important work.

Every Plant Superintendent will be interested in our new booklet. "Power Transmission in Principle and Practice." A postal request will bring it.

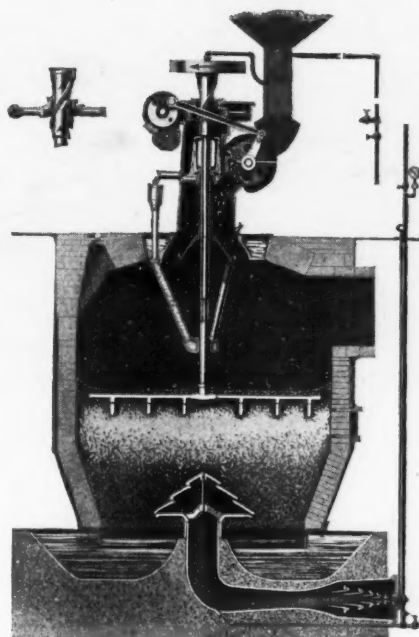


MAIN BELTING COMPANY • Philadelphia

New York Chicago Pittsburgh Atlanta San Francisco



Coming out at the top when you figure up your profits at the end of the season is largely a matter of providing the most efficient and economically operated equipment. Heating your Kilns with producer gas generated in the **CHAPMAN AGITATOR PRODUCERS** will increase and improve your production and add to your profits.



Guard Your Fuel Supply

A thief is stealing your coal every hour your plant operates—tons of it in a month—yes, thousands of dollars' worth in a year. That thief is your out-of-date system of burning fuel for heating your Kilns. The remedy is to install the **CHAPMAN System** for the efficient production and application of Producer Gas. Developed through years of thorough study. Since 1908 we have done nothing but build improved Gas Producers and engineer Gas Producer installations. During that time we have gathered within our organization some of the most able engineers from both this country and Europe. Much progress has been attained. Many of our customers report a saving as high as 100 per cent on the investment in one year's time. Investigate.

PRODUCTION INCREASE

You can increase your production of high grade lime by heating your kilns with producer gas generated in

CHAPMAN AGITATOR PRODUCERS

They deliver a constant supply of high quality gas, thus insuring a uniform temperature in the kiln. This uniform supply of high quality gas burns with a long, clear flame which resembles the flame from a wood fire. The result is a greater production of first grade lime.

THE CHAPMAN FLOATING AGITATOR will increase the capacity and the efficiency of hand-poked producers already in operation.

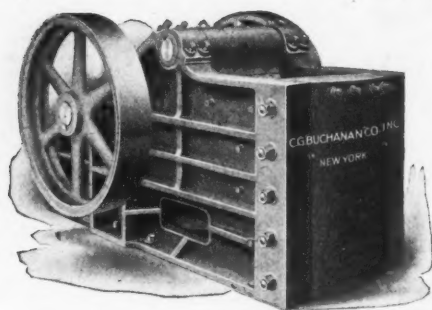
Write us for the nearest installation you may visit, or send for our special information.

The Chapman Engineering Company
Mt. Vernon, Ohio

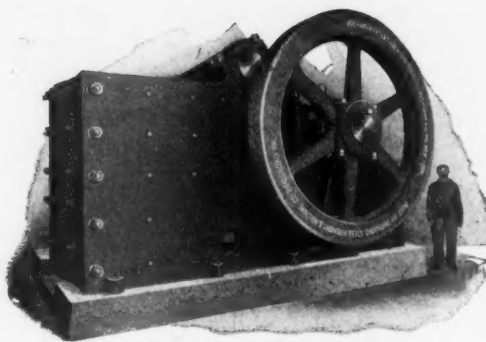
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Built for Continuous Service



Type "C"—Panel Side Frame



Type "C"—Box Side Frame

BUCHANAN JAW CRUSHERS

ALL STEEL PATENTED

The Panel Side Frame Type is of simple design but of ample weight to crush the hardest ore and all are furnished with our patent adjustable jaw stroke, shim adjustment for regulating size of product, manganese steel jaw and cheek plates, steel toggles with machined ends, manganese steel toggle bearings, water jacketed bearings and parting spring balanced pitman. The front and back heads, swing jaw and pitman are of the box type of construction provided with heavy internal ribs and braces running vertically and horizontally.

The Box Side Frame Type is designed only for the purpose of preliminary crushing and will make a six-to-one reduction on the hardest rock or ore. It is built with Side Frame, Front and Rear Head, Pitman, Swing Jaw and Toggles of the very best quality of Open Hearth Steel, thoroughly annealed—all joints under strain carefully machined, water Jacketed Bearings, Spring Balanced Parting Pitman and adjustable jaw stroke, and all bearings have a double system of lubrication. It can be furnished in various sizes for either rope or belt drive.

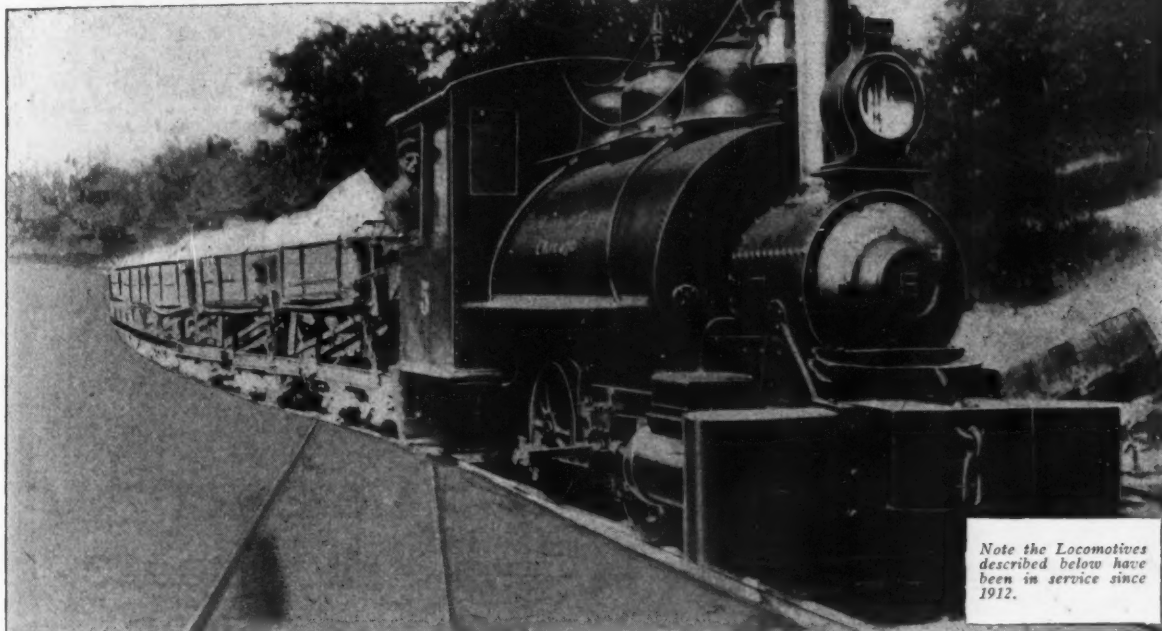
A wide range of adjustment—easily made—is a feature for our machines

Sizes Range from 2 in. x 4 in. to 66 in. x 86 in.

Catalogs on Request

C. G. Buchanan Co., Inc.
90 West St., New York

VULCAN Locomotives



Note the Locomotives described below have been in service since 1912.

- Size:—** Standard 18-ton, 10x16, four driver, saddle tank, contractor's locomotive.
- Load:—** Fifteen 4-yard Western dump cars, well loaded with coarse sand. Weight of car, empty, about three tons. Weight of load in each car, about seven tons. Or a total of 150 tons for the fifteen cars.
- Grades:—** 2 per cent and $2\frac{1}{2}$ per cent.
- Figuring 20 lbs. frictional resistance, the tabled capacities of this size locomotive is 106 tons to start on a 2 per cent grade or 89 tons to start on a $2\frac{1}{2}$ per cent grade. Whereas it is actually starting and hauling a load of 150 tons on these grades. (A locomotive efficiency of 141.5 per cent and 168.5 per cent, respectively.)
- This is the regular load for these (three of this size are operated by the contractor who made this report) locomotives, working steadily every day on a $2\frac{3}{4}$ -mile haul.



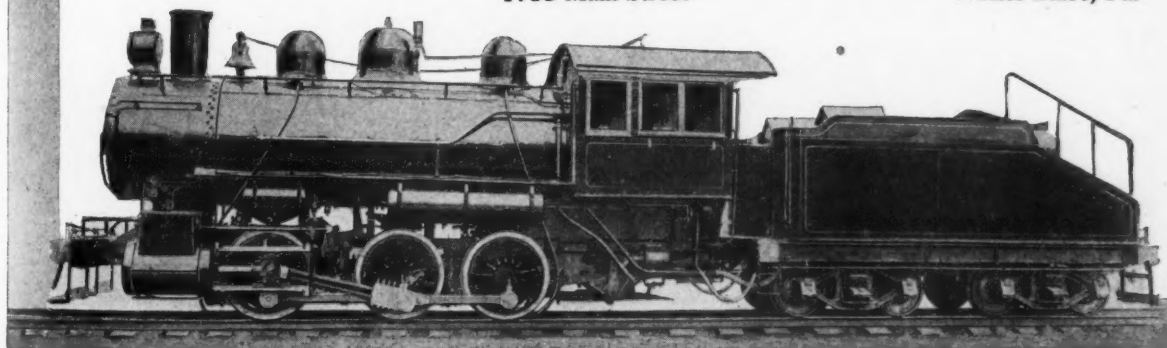
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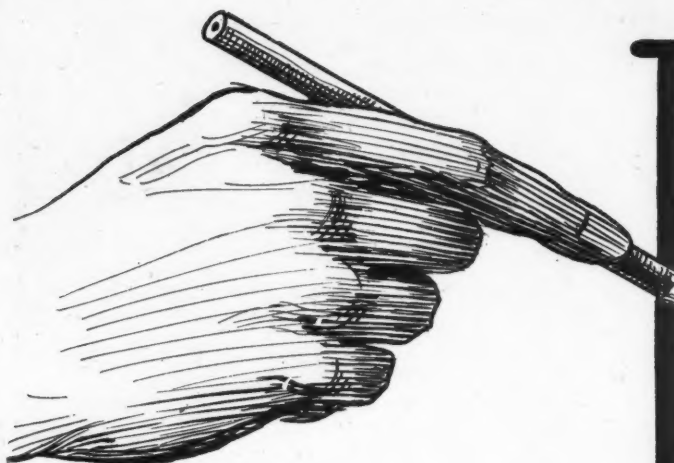
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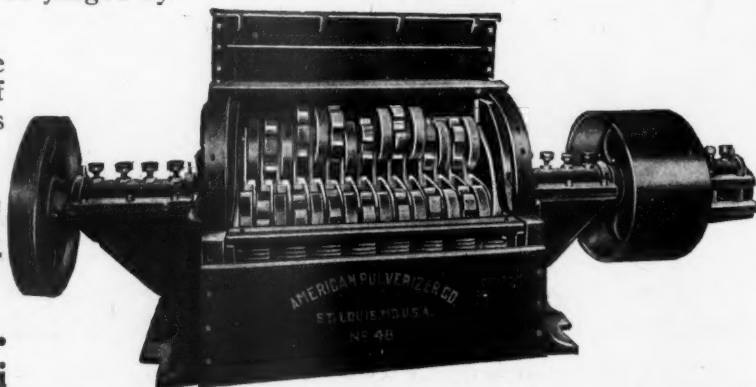
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Rock Products

Vol. XXIII

Chicago, July 3, 1920

No. 14

Sand, Gravel and Crushed Stone Industry of Portland, Oregon

Producers Generally Go into All Three Lines—Material Moved to City by Water

EVEN THE CASUAL VISITOR to Portland, Ore., would be impressed by the importance of its sand, gravel and crushed stone industries, because a long stretch of water front on the south side of the Columbia River opposite the principal business section of the city is given over entirely to these industries.

Practically all the sand in the Portland market is dredged from the Columbia River within twenty miles of the city. There are three grades or sizes of this sand: (1) "muck" sand, which is very

fine, all of it passing a 120-mesh and about 30 per cent of it a 200-mesh—this is much used as a filler in asphalt pavements; (2) mortar sand and (3) concrete sand.

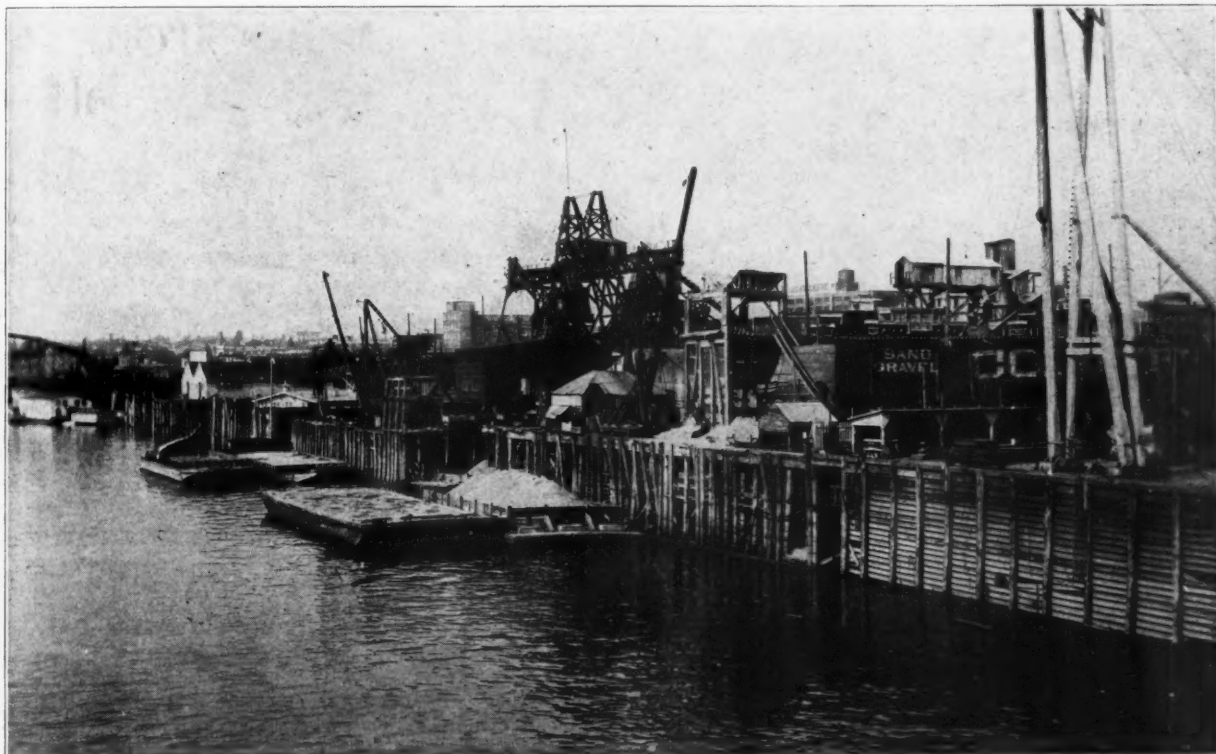
These three kinds of sand are pretty well segregated by the current of the river and are found in distinct deposits, so that the kind of material dredged depends on the part of the river worked.

The common type of dredge used on the Columbia River is the derrick boat with a boom at the bow and a clam-shell

or orange-peel bucket hung from it. The clam-shell generally dumps into a hopper that feeds a washing screen. These dredges have no power for navigation and are towed from place to place.

The only pump boat or "sand sucker" operated on the river at the present time is that of the Columbia Contracting Co. The conditions appear to be ideal for pumping operations, but local practice has grown up in favor of the derrick boat to the exclusion of all others.

All the gravel in the Portland market



Columbia river front at Portland, Oregon, showing sand and gravel plants of various companies

comes from the Willamette River, which runs into the Columbia at Portland. The type of dredge used here is the regulation bucket-and-ladder dredge common in similar Eastern river operations. The only screening done on these dredges is to separate the sand from the gravel.

There is a genuine scarcity of gravel. The Willamette River deposits, it is said, will last but a few years longer. In order to supply stone with their sand some of the principal sand and gravel operators have gone into the quarry business. Fortunately the Columbia River 30 to 40 miles below the city is bordered by basalt cliffs on both sides. These are frequently accessible by bayous or inlets from the river and several crushing plants have been established at the water's edge.

This gives Portland a plentiful supply of both stone and sand by means of barges on the river. These barges are unloaded to shore bins or bunkers by means of derrick-operated clam-shells, as shown in the accompanying view. The

bunkers have both truck and railway loading facilities.

Details of some of these operations will appear in a later issue.

Sluicing Sand and Gravel

SEATTLE, WASH., sand and gravel operators have discovered the secret of cheapest operation. It is excavation by hydraulic methods, sluicing the sand and gravel to the plant in steel-lined flumes and screening and washing them with the water that flows along.

These methods are possible because of some wonderful gravel deposits on the shores of Puget Sound, in one or two instances rising to a height of 150 ft. above the water level. Complete details of these operations will be published in a later issue, as experience with them points to many economies in sand and gravel plant and quarry stripping operations.

This method of excavating and conveying sand and gravel is the outgrowth of

hydraulic gold mining, which at one time was popular in California and is still considerably employed there. This method has been used by Puget Sound sand and gravel operators for many years, and their experience with its economies led to its adoption for the very extensive re-grading work done by the City of Seattle about ten years ago. Perhaps the most that can be said for the economy of this operation is the fact that Puget Sound sand and gravel producers are still selling material for as low as 50 cents per cubic yard, f.o.b. plant.

The view below shows a typical operation. Water for this operation is pumped out of Puget Sound and piped under considerable pressure to hydraulic monitors or nozzles, which are directed against the bank. The streams of water, sand and gravel flowing away from the bank are directed into flumes, which are laid on grades of about 12 per cent. This slope necessitates leaving a valuable portion of the bank untouched, but the very high face makes this negligible.



View of a typical sand and gravel sluicing operation

The Design of Sand and Gravel Screening and Washing Plants

III. Feeding and Elevating the Raw Material—Bucket Elevators and Belt Conveyors—Respective Merits

PRELIMINARY CONSIDERATIONS, gravel-pit excavation methods and transportation of the materials from pit to plant have been discussed in two previous articles in this series, which started in the June 5 issue.

Feeding

The receiving hopper, where the excavated bank run sand and gravel first enters the plant, is a unit which is and always has been a necessity and requires very little comment. The main requirement is that it be large enough to act as an equalizer between the train trips from the shovel and the rate at which the plant will handle the material. One of its sides should be much steeper than the others, which will prevent arching at the outlet. This side should have an angle of about 60 degrees to the horizontal. The balance of the hopper may better be made with a flat bottom, allowing the material to form its own hopper. This construction not only eliminates wear on three sides of the hopper, but is much cheaper to construct.

The automatic feeder at the outlet of

By Frank M. Welch

Chief Engineer of The Greenville Gravel Co., Greenville, Ohio

the receiving hopper, is now an almost indispensable unit, but it has been generally used not more than seven or eight years. This feeder automatically regulates the flow of the raw material onto the belt conveyor or into the bucket elevator, into a scalping screen or direct into a crusher, at a uniform rate, equal to the capacity of the plant. Without uniform feeding, the daily capacity of the plant will be cut about 50 per cent.

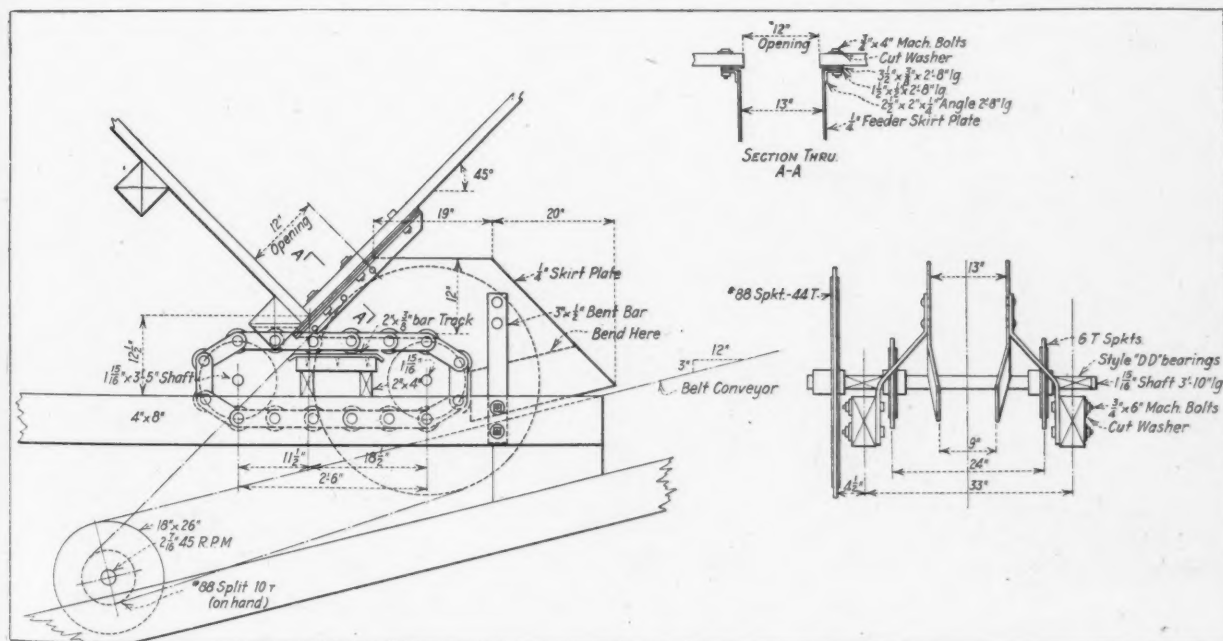
The old method was to have a man at the hopper outlet, constantly operating a gate, which partially accomplished uniform feeding. The automatic feeder, which is usually driven from the tail shaft of the belt conveyor or elevator, requires very little horse power to operate. By eliminating the man at the gate, it pays for itself in a few months and does the work much better than the man did.

There have been several designs of

feeders tried out. The reciprocating feeder was first used, of similar design to those in such common use at coal mines. It succeeded in feeding uniformly, but it wore out very rapidly and required more horse power to operate than the steel apron feeder. These latter have fulfilled the requirements so well that they have come into general use. The details of their design have been improved from year to year until they have become a standard unit.

Elevating

In most plants, the natural location of the feeder being so near the bottom of the pit, the next step is to elevate the material. This is customarily done either with a belt conveyor or a bucket elevator. This unit elevates the raw material and discharges it either at the top of the crushing plant or of the main screening and washing plant. Among the largest plants, the belt conveyor is in most common use. In such plants, where the rejection from the main screens, are spouted by gravity to the crushers, an elevator rather than another belt conveyor is used to re-elevate it



Example of an automatic feeding device at outlet of receiving hopper



Compact plant arrangement showing housed belt conveyor



An example of a belt conveyor for taking material from bottom of pit

either to the same screens or to stone screens.

Bucket Elevators

During the early stages of the sand and gravel industry, the bucket elevator received many black eyes, not because it was not a suitable type of equipment for the purpose, but because it was not properly designed for the purpose intended. In the beginning, elevators having the buckets mounted on belts were used, borrowed or copied from the successful type of bucket elevator so long used for handling grain. The short life and excessive stretch of these belt elevators soon demonstrated that the handling of sand, and gravel and crushed boulders presented a widely different problem. Then the chain type elevator was tried out, and in most cases this failed even worse than did the belt type.

The early chain elevators failed because the buckets were mounted on light malleable iron chain instead of the double strand of heavy bushed steel roller chain, which is used on the big successful stone elevators of today. These elevators, properly designed with 3/16-in. or 1/4-in. steel buckets having reinforced lips, mounted on two strands of chain made up of heavy steel bars, large diameter case-hardened steel pins, thick case-hardened bushings, with about 6-in. diameter self-oiling, single flanged white iron rollers at each articulation point, have been found to give less trouble and require less maintenance expense than any other unit in the entire plant. These elevators, however, should be equipped with buckets large enough that they can easily handle the required capacity without traveling more than 75 or 80 ft. per minute.

Belt Elevators

The belt elevator is still used in some large plants for secondary elevating with some success. The belting used, however, is the best grade obtainable and of as many plies as will properly bend over and adhere to the head pulley. The head pulley on such elevators should be extra large, so that an eight-ply belt can be used.

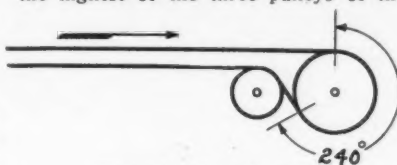
The troughing belt conveyor has given excellent satisfaction from the early stages of the sand and gravel industry. This industry has developed improvements in several details of this as well as in the bucket elevator. The automatic take-up illustrated herein has proved far superior to the old type of screw take-ups formerly used as bearings for the tail pulley shaft. It not only keeps the belt in uniform tension all the time, regardless of weather conditions, but it permits the tail shaft to run in fixed permanent bearings which greatly benefits the drive to the feeder.

Take-Ups on Belts

The pulleys used on the automatic take-up as well as at the head and tail of the conveyor, should be of large diameter to increase the life of the belt. The belts which are usually six or eight ply constantly deteriorate on account of the intermittent stretching of the outer-plies when bending over the pulleys, the bend of course being greater over the smaller pulleys.

It should also be borne in mind that regardless of the arc of contact or the portion of the circumference of the pulley that the belt touches, even though it be only 5 degrees, the bend is the same as if the belt wrapped three-fourths of the way around the pulley.

On long conveyors a snub pulley is customarily used just behind the head pulley and under the return side of the belt, to increase the arc of contact of the belt over the head pulley. An excellent design is to locate the automatic take-up near enough to the head of the conveyor, that the snub pulley will act as the highest of the three pulleys of the



Example of snub pulley

take-up. Furthermore this is the logical location for the take-up because the slackest portion of the entire belt is immediately after it leaves the head pulley.

Troughing Conveyors

The belt conveyor, like the bucket elevator was borrowed from the well developed line of grain handling machinery. In handling grain, the troughing rollers or idlers are designed so that the trough formed is a curve throughout. In handling heavy materials such as sand, gravel and stone, it has been found that if the belt can be run almost flat, with just the edges turned up a little to keep round pebbles from rolling off, the life of the belt will be greatly increased. Therefore the ordinary troughing idlers which are on the market must be ordered of special design to accommodate the best operating conditions for a conveyor handling sand and gravel. Furthermore, the idlers now on the market are mostly of such light design that their life is short, and if a boulder happens to start rolling down the belt it often breaks off one of the concentrating rollers when it gets to the edge of the belt. For our own plants, therefore, we have been making our own troughing idlers in our local repair shop, of steel pipe shrunk onto cast-iron ends, with turned steel gudgeons cast in and mounted on heavy split bearings. This step has reduced the cost

of maintenance of our belt conveyors considerably.

Typical trestles for supporting belt conveyors, are shown in the accompanying cuts. Walk-ways should extend along both sides of the conveyor to facilitate easy access to the grease cups on the troughing and return idlers. The troughing idlers should be spaced about 4 1/2 ft. apart and the return rollers at about 10 ft. intervals.

The question is so often asked "Does it pay to house in the conveyor?" It is a generally accepted fact, that the protection the housing affords from the weather, will increase the life of the belt enough to shortly pay for the gallery.

(To be continued)

Fluorspar in 1919

REPORTS received from most of the principal producers of fluorspar, according to Hubert W. Davis, of the United States Geological Survey, Department of the Interior, indicate that the total shipments from domestic mines in 1919 amounted to about 122,000 short tons, valued at \$3,102,000 as compared with 263,817 tons, valued at \$5,465,481, in 1918. These figures show a decrease in quantity of 54 per cent and a decrease in value of 43 per cent. The general average price per ton f.o.b. at mines or shipping points for all grades of fluorspar in 1919 was \$25.43, which is \$4.71 per ton more than the average price received in 1918. The average price received in 1919 was higher than the average quoted price during the year, because a considerable quantity of gravel spar was sold in 1918 for delivery in 1919, at prices between \$30 and \$35 a ton. On the other hand, the average price reported in 1918 was lower than the average price quoted during that year, because a considerable quantity of gravel spar was being delivered on old contracts at prices between \$5 and \$10 a ton. Kentucky and Illinois fluorspar was quoted during practically the whole year of 1919 at \$25 a ton f.o.b. at mines for 85 per cent washed gravel spar, and at \$22.50 a ton for 80 per cent similar material, but according to reports these prices were shaded more or less.

Uses of Fluorspar

The shipments of gravel spar, the grade used principally for flux in the manufacture of open-hearth steel, amounted in 1919 to about 110,000 short tons as compared with 236,121 tons in 1918.

The total quantity of merchantable fluorspar mined in 1919 amounted to approximately 129,000 short tons as compared with 270,412 tons in 1918.

The stocks of fluorspar at mines or shipping points amounted at the end of 1919 to about 25,000 tons as compared with 22,779 tons at the end of 1918.

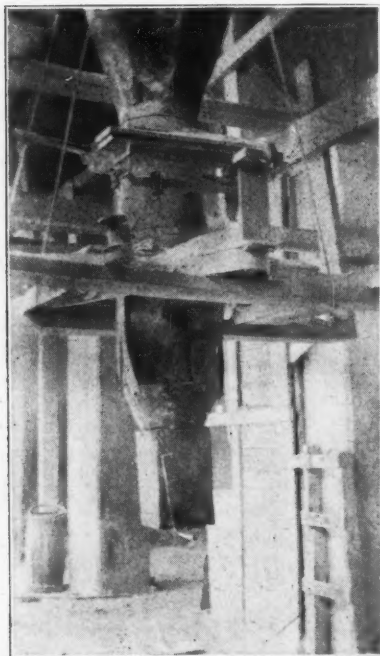
Hints and Helps for the Plant Superintendent



Drag-lines for phosphate-rock quarrying

Suspension Scales to Load Lime Barrels

SINCE THE GOVERNMENT has specified a net weight for a barrel of lime and as the weight of the barrel itself is a rather variable quantity, the Gager Lime Co., Sherwood, Tenn., has devised the method shown herewith to



Device for weighing and loading lime in barrels

weigh the lime which goes into the barrel.

The apparatus consists of a beam mounted scale with a pocket or hopper which will hold a legal barrel of lime. This is located immediately below the lime storage bin so that the lime may be run into the scale until the beam tips and then the flow is shut off automatically. The barrel is set beneath the scale and the weighed amount of lime is run into it.

Drag-Lines for Phosphate Mining

THE HOOVER-MASON PHOSPHATE CO., Mt. Pleasant, Tenn.,

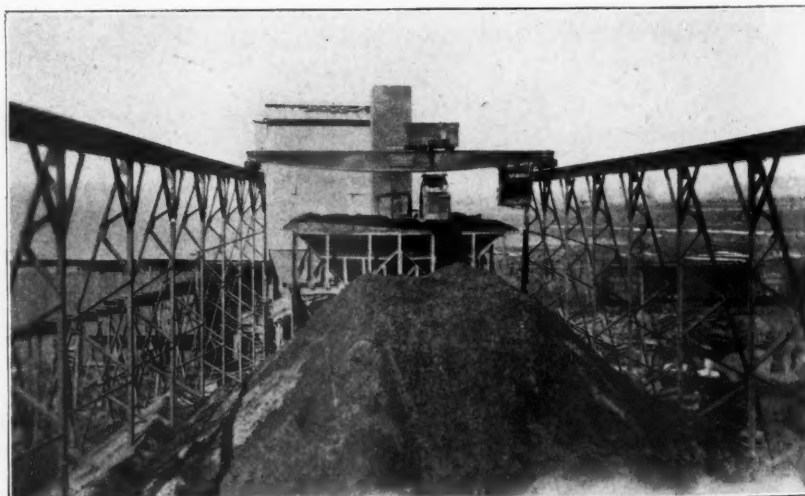
has adopted the drag-line method of handling both overburden and phosphate rock. The overburden is removed with a $2\frac{1}{2}$ -cu. yd. drag-line scraper bucket and the phosphate is mined with smaller drag-line scraper using a $1\frac{1}{4}$ -cu. yd. bucket. Since the phosphate is underlaid with a rugged layer of limestone, the material must be mined by a machine that will ride on the bank and reach down into the mine.

The overburden is moved into a part of the mine which has already been exhausted—a strip of some 60 ft. being cleared at a time. The smaller machine follows and loads the phosphate into large side-dump cars by means of a portable chute hopper. The drag-lines remove the material only down to the level of the limestone. Below that level a cantilever machine is used; this is described in another issue of ROCK PRODUCTS.

Dewatering Phosphate Rock

AFTER PHOSPHATE has been mined and washed it must be dried and either shipped to the fertilizer plants or ground for direct application to the soil. As the phosphate comes from the washers it is wet and is hard to dry. The wet product requires much coal, calks in the driers and is very hard on the drier shell.

In order to remove a considerable part of the water before sending the product



to the driers the International Agricultural Corporation has installed an intermediate storage or drainage space at its Mt. Pleasant, Tenn., plant. The material is dropped into the storage from the classifiers and screens and is picked up and moved to the driers by an electrically-operated traveling crane. The accompanying view, taken from on top of the washers, shows the drying yard arrangements.

Revolving Dump Car

THE CONSOLIDATED PHOSPHATE CO., whose main offices are in Columbia, Tenn., and whose property is in Lewis County, Tennessee, has to remove considerable shale in opening up its phosphate face.

The type of revolving dump car here illustrated was used to great advantage. The cars are of steel and the bed is pivot-mounted upon the running gear so that it may be rotated and dumped.

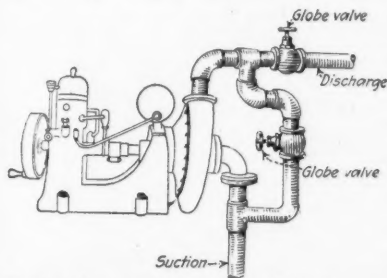
The waste shale was used to fill in for a side track. The track was laid a section at a time, so that the cars could be run out to the end of the fill, revolved and dumped.



Revolving dump cars used for phosphate quarry stripping

By-Pass on Centrifugal Pump

A SUCCESSFUL arrangement for preserving continuous flow and of preventing a centrifugal pump from losing suction due to low water in the sump, is shown by the accompanying sketch. The discharge is simply by-passed around the pump and through it again in such volume as the circumstances require. By proper adjustment of the



Maintaining suction on centrifugal pump

globe valves on the discharge pipe and on the by-pass the water can be kept at any desired level in the sump. This arrangement is called to the attention of contractors by R. T. Brown, chief of surveys, South Carolina State Highway Department.—"Engineering News-Record."

Reinforced Concrete Dynamite Storage House

THE FOSTER & CREIGHTON CO., whose main offices are in Nashville, Tenn., and whose principal quarry is located at Rockwood, Ala., has devised a reinforced-concrete dynamite storage



Reinforced concrete storage house for explosives

house. The site for the structure was selected so that the further protection of a hillside would be obtained yet so that it would be high enough to be very dry.

The structure is approximately 18x24 ft. and 8 ft. high. The building was designed and constructed by the company. Ventilation is secured by a number of pipes through the wall near the ceiling. These are turned up at a right angle on the inside as a precaution against a stray bullet entering from a hunter's gun.

Rock Crusher With Safety Overload Device

A NEW ROCK CRUSHER, developed in Sweden during the war, incorporates a new detail in design which insures safety against overload. In this machine the power is transmitted from the crank shaft to the oscillating jaw through an unequal arm lever, and through a roller mounted between the main roller and the jaw. The jaw forms the concave face upon which the roller operates without

sliding friction and without need of lubrication. The lever is constructed in two parts, kept together by a hinge and by a safety bolt arranged to break for an overload, caused for instance, by the lodgment of a sledge hammer between the jaws. When such an overload occurs and the bolt breaks, the motion of the lower part of the lever is stopped. The upper part of the lever continues to move, swinging on the hinge until the motive power is shut off and a new safety bolt inserted. The safety bolt is turned with a narrow incision to a certain depth, leaving the bolt strong enough to stand any normal strain. Under the head of the bolt is placed a cupped disk of hardened steel designed to deflect more than the bolt stretches.

The crusher, which has been used extensively for crushing road material, is described in a recent letter from Gustaf Rennerfelt, of Stockholm, Sweden, who claims for his invention over other stone crushers higher efficiency, less need of lubrication, and particularly safety against overload.

Profit-Sharing Plan of the General Crushed Stone Company

Interest-Bearing Notes in Lieu of Cash Dividends—Other Measures Looking to the Welfare of Employees

THE GENERAL CRUSHED STONE CO., with offices at Easton, Penn., and crushing plants at North Le Roy, Genesee County, N. Y.; Akron, Erie County, N. Y.; Little Falls, Herkimer County, N. Y.; Hendler's and White Haven, Luzern County, Penn.; Redington, Northampton County, Penn.; Rock Hill, Bucks County, Penn.; Glenn Mills, Delaware County, Penn., and Winchester, near Boston, Mass., is probably the largest crushed stone quarry operator in America next to the France Stone Co., of Ohio, which operates some 30 quarries. The president of the General Crushed Stone Co. is John Rice, now president of the National Crushed Stone Association.

Mr. Rice is known by his friends and associates to have very liberal ideas on all business policies. He has given the matter of industrial relations the closest study and has endeavored to work out the problems of employer and employee in such a manner that the humblest employee shall maintain his self-respect, and that there shall never be the slightest semblance of paternalism on the part of the management. In other words Mr. Rice is an out and out American and would work out his industrial problems in keeping with real true American ideals, in which paternalism has no place; and with that knowledge which comes sooner or later to all intelligent men, that the greatest and truest success in life comes from developing in other members of the human race, their best instincts.

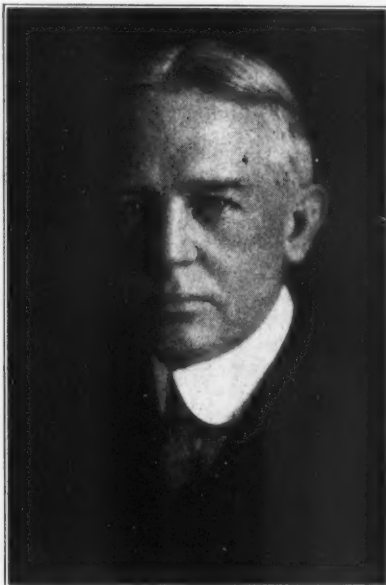
First Principles

The following is based on an informal talk by Otho M. Graves, assistant to Mr. Rice, at a Kiwanis club luncheon in Easton, about two months ago. Mr. Graves said:

"We have no elaborate scheme or particular organization for accomplishing what we believe to be desirable results, nor are we undertaking this work as an expedient to tide over at least temporarily the unsettled restless labor conditions. We do not feel that we are showing any particular originality and realize perfectly well that policies which may be applicable to this company would have to be modified considerably to adapt them advantageously to another industry. This

company operates nine separate plants and we have gathered the men of each plant together and held very straightforward and informal discussions of the situation. We have submitted to them as our conscientious belief, the following principles:

"1. That every employee is entitled to a fair share of any profits which may



John Rice

be made. Acting upon this belief, the profits of last year were divided in the following manner: Assume, as an example, that it required two million dollars to do business for the year, including depreciation and all other proper charges, and that the product was sold for two million one hundred thousand dollars. The profit on this business would obviously be one hundred thousand dollars. If the capital invested plus the annual pay roll is assumed to be three million dollars, the percentage of profit is evidently 3 1/3 per cent.

"Each employee would then receive 3 1/3 per cent of his salary or wages for the year as his share of this profit. Dividing the profit in this way, means that the profit to which the employees are entitled is to the total profit as the payroll is to the combined capital invested and payroll.

"In our particular case that share of the profits to which the employees are entitled amounted to approximately one-third of the total profits. No profit is realized, of course, until wages are charged off against operating expenses and wages we believe should be the common current market rate and 5 per cent paid to the capital, including the profit-sharing notes, as its wages or interest. That portion of the profit of last year, which was paid to employees, was issued in the form of profit-sharing notes dated January 1, 1920, payable on demand after January 1, 1921.

Reasons for Profit-Sharing Notes

"There are two reasons why the profit due each employee was paid in the form of notes rather than by giving them the cash. First—by this method he is forced to save at least that amount for at least a year which in itself is desirable. At the end of the year, he may either continue to let this amount remain in the company as a desirable investment, or if he so desires he can receive cash for his note. Second—he becomes an investor in the company, and his interest in the welfare of the company is probably to that extent stimulated.

"Since 5 per cent is paid capital prior to determining the amount of profit, these notes are also paid 5 per cent inasmuch as they are as much capital as any other money invested in the business of the company. Further, these notes share in the profit in the same way as any other capital shares and as briefly indicated; the workman, therefore realizes that he is sharing in the profit of the company both as a laborer and as a capitalist in so far as the amount of his note represents capital. Incidentally by paying this profit in the form of a note, the working capital of the company is not impaired.

Voice in the Management

"2. If it is accepted that the employees have a right to share in the profits of

the company, then it follows logically that they have a right to a voice in the management of the plants in order to properly assist in creating a profit in which they have a right to share. In order that this voice may be expressed in a convenient manner, the men at each plant are requested to elect a committee of three men to meet informally and as occasion arises with the superintendent of the plant and a representative from the Easton office. This plant committee, together with the superintendent and the representative from Easton, is free to discuss any matter or problem affecting the men, the company, or the production of the plant. They can discuss the question of wages, working hours, living conditions, conditions about the plant, methods of increasing the production, of operating more economically, or any other question which is of interest to them. This discussion is not merely idle expression of opinion but whenever any suggestion is shown to be right and proper, we endeavor to assist in putting it into execution, if it is at all feasible. The meetings of this committee are held with sufficient frequency to remove any undue formalities of awkwardness in the discussions.

"3. It is agreed that the conditions under which a man works should be made as comfortable and pleasant for him as the nature of his work permits. This could be carried to an extreme which would render it merely absurd, but it is interpreted in a common sense, practical way, constantly bearing in mind that a man works more happily, contentedly and therefore more efficiently, if he is as comfortable as the kind of work he is doing permits him to be.

"The three principles indicated above

are already in operation and it is the hope that the two following can soon be installed. The question of how soon they can be made effective is dependent upon the attitude of the men themselves and this has been clearly stated to them.

Advanced Principles

"4. A man should be paid even though he is sick and unable to work. When a man is ill he is in greater need of money than when he is well because of obviously increased expenses.

"5. With particular reference to the so-called common laborer and those men on an hourly rate, it is believed that they should be paid for time lost due to conditions beyond their control, such as rain, car shortage, plant breakdowns, etc. It seems unfair to a man who has agreed to work for you at an hourly rate and who is expected to come out every morning and work until the close of the day's operation, to dock his time for any portion of that day, if he was prevented from working by conditions similar to those just noted.

"In explaining to the men our belief in the moral justness of these principles, we do not fail to emphasize the fact that each thing which belongs to us as a right must necessarily be accompanied by a corresponding responsibility and obligation. Each of us realizes, as a matter of course, that the laws of the community in which we live entitle us to protection in various ways. No man, against our will, has a right to come in our front yard and dig up the sod in search for angle worms for bait on a proposed fishing expedition. On the other hand, we must respect the right of others to prevent our committing a similar act of vandalism.

"We have placed, in talking to the men, particular emphasis on the obligations accompanying the rights which we believe are theirs. If, for instance, it is accepted that each employe has a right to share in such profit as the company may make, he is under the obligation of doing his fair and honest part to create such a profit. The responsibility accompanying his right to a voice in the conduct or management of the operation is that he will use this voice properly and wisely and considerably, being as much interested in ascertaining the views of his employer as he is in explaining his own. The same obligation, of course, rests upon the employer. If he feels, as we do, that it is his right to be paid if he is prevented from working by sickness or weather conditions, etc., he should hold himself ready and willing to occasionally work overtime when the exigencies of the operation may demand, without expectation of additional pay for this time.

Motive Not System Counts

"It should be observed that it is difficult to reduce ethical principles to a formula or system. We are merely endeavoring in a straightforward way to examine ourselves to make sure that we are doing our part in that relationship which exists between capital and labor, believing sincerely that such an attitude on our part will result in a similar reaction on the part of labor. We are not unmindful of the danger of over-emphasis of the profit-sharing part of this conception of things, inasmuch as there are factors entering into profit and loss which are beyond the control of the plant employes. They might be doing all in their power to insure a profit but adverse conditions

THE GENERAL CRUSHED STONE COMPANY

\$.....

No.

Participating Certificate of Indebtedness

Easton, Pa., 192.....

THE GENERAL CRUSHED STONE COMPANY promises to pay to

the sum of Dollars, without defalcation for value received, with interest at the rate of Five Per Cent. (5%) per annum, at the office of the Company, in Easton, Penna.

In addition to the guaranteed rate of 5 per cent. per annum, the Company also promises to pay semi-annually out of the net profits earned currently a dividend on the amount of this certificate to be determined as follows:

When the net profits shall have been ascertained in accordance with the usual charges made against the gross profits, there shall be deducted therefrom 5 per cent. per annum of the book value of all outstanding stock of the Company. The balance of the net profits divided by the sum of the book value of the stock plus the amount of these certificates outstanding will result in the rate of participation applicable to this certificate. These certificates shall not participate in profits of fractional parts of semi-annual periods.

The Company reserves the right to terminate this contract on thirty days' notice on the payment of the principal and accrued interest at the rate of seven per cent. (7%) to include the guaranteed rate of five per cent. (5%) and the said dividend. In such event interest will cease after the expiration of the date indicated in notice.

Payments due under this contract up to June 30th and December 31st will be paid on the following August 1st and February 1st, respectively, at the office of the Company in Easton, Penna., or will be sent to the address registered in the Company's office for this purpose.

THE GENERAL CRUSHED STONE CO.

Secretary.

President

might prevent the desired result. If excessive emphasis had been placed, therefore, on the profit-sharing thought, the news that no profit had been made would be rather puzzling and would perhaps result in a rather sickening thud, as their artificially stimulated hope of profit collapsed. The various factors entering into a successful prosecution of the business are, therefore, made as clear to the men as possible, our attitude simply being that if there is a profit, whether large or small, we believe that they are entitled to a fair share of it.

"These ideas were presented to the men at the various plants early this spring and sufficient time has not yet elapsed to render possible any reliable opinion as to the probable effect of this way of working. We are also aware of the danger of basing definite conclusions on insufficient data, but so far as we have gone, little things about the plants tend to show that the men are far from unresponsive to this line of thought, nor are they disinclined to believe that we are prompted not by material motives of expediency, but are rather trying to conscientiously fulfill our part of what we conceive to be our mutual moral obligations."

A Typical Southern Quarry Operation

THE LIGHTMAN STONE CO., Mill Creek, Tenn., is an instance of a typical Southern stone quarry operation. The accompanying view which was taken early this spring and just after a severe rainy spell will give the general layout of the plant and quarry.

The plant has a daily capacity of 300 tons of crushed stone and agricultural limestone. When the plant was originally built it was intended to produce commercial stone exclusively, but during late years the southern farmers have been so emphatic in their demand for agricultural limestone that the company has in-

stalled a large swing hammer pulverizer. Now during the shipping season as much as 80 tons per day is reduced to approximately 10-mesh material for the farmer trade. Unfortunately, the company has only limited storage facilities and so the product is made only during shipping seasons. An overhead bin is provided however for about 100 tons of material.

Owing to the fact that Mill Creek is only a mile and a half from Nashville, current may be purchased and the company has long ago discarded the old boilers and has installed motor drive throughout. This is an unusual feature in most southern quarries because it is generally impossible to purchase current. A 175 h.p. motor drives the No. 6 and No. 3 gyratory crushers, the stone elevator, the cylindrical screen and the hoist used on the incline. A 150 h.p. motor is used on the pulverizer and elevator. Drilling is done with an electrically operated well drill.

Mica Deposits Must Be Large to Succeed

PERSONS WHO ARE INTERESTED

in deposits of mica should note the statement of the United States Geological Survey that only a large deposit of mica favorably located with regard to transportation and a grinding mill can be probably worked solely as a source of scrap mica for grinding. Most mica mines must also yield good sheet mica to make the mining profitable.

Mica to be of value as sheet must yield rectangles at least one and a half by two inches which must split easily and evenly, be free from cracks, markings, and fracture lines, and be reasonably free from specks or foreign mineral matter. The size stated is the smallest rectangular size which is salable as uncut sheet and the rough-trimmed mica sheet must be nearly twice as large to yield the rectangle stated. In order to be profitable most deposits must also contain

some mica larger than one and a half by two inches.

If mica did not usually contain much foreign matter and did not have so many fissures and imperfections—cracks, markings and holes—there would be no difficulty in obtaining all the mica needed. But, in proportion to the mica mined there is only a very small percentage of sheet mica which when finally prepared is of the proper quality to be used in the industries.

Good sheet mica should be so flexible that a sheet a thousandth of an inch thick can readily be bent into a cylinder one-quarter of an inch in diameter without showing any cracking.

There is also a great variation in the hardness of mica, the Geological Survey recognizing seven different degrees of hardness. Mica is often erroneously called isinglass. This latter substance is a gelatin made of the air bladders of certain fish. The substance is soluble in water and burns readily, whereas mica is neither soluble nor combustible.

The production of the various kinds of mica in the United States ranges from 3,000 to 5,000 tons a year.

Agricultural Lime Demand Moving West

THE DEPARTMENT OF SOILS of the University of Missouri is carrying on a campaign to learn how much acid soil there is in Missouri. They are testing for acidity all samples sent in by farmers and making a complete report as to how much lime is needed. In cases where soils are very sour information is being sent the farmers as to how much lime should be applied, where it can be secured and at about what price.

Every decade sees a movement of agricultural lime consumption West. Already soil investigations in Nebraska for lime requirements are under way. Only in the most recently cultivated soils is the lime content enough for the best results.



Quarry and plant of the Lightman Stone Co., Mill Creek, Tenn.

May Have a President Who Knows the Rock Products Industry

Senator Harding Comes from a Lime and Limestone Center and George B. Christian, of the White Sulphur Lime & Stone Company, Is His Secretary

PRODUCERS OF AGRICULTURAL LIME AND LIMESTONE, who were in close touch with the work of the war service committees of this industry during 1917 and 1918 know Senator Warren G. Harding, of Marion, Ohio, the republican candidate for president, as a sympathetic friend in need. With his knowledge of the Ohio farmers' crying need of lime he was able to be of material assistance in getting agricultural lime and limestone placed on the essentials list.

Senator Harding was born on a farm in Morrow County, Ohio, which adjoins Marion County on the East. This is just on the edge of the state's western limestone belt. As he grew up a farmer's boy he was not unfamiliar with quarries from his earliest recollections.

Marion, Ohio, which has been Senator Harding's home since early manhood, is the center of some of the largest quarry industries of the state. Near here are lime kilns and crushing plants of the Kelley Island Lime and Transport Co., the John Evans Lime & Stone, the White Sulphur Lime and Stone Co., the France Stone Co., and several others. It is also the home of the manufacturers of the Marion and Osgood steam shovels.

With his early agricultural experience and his later career as editor and owner of Marion's principal newspaper, it can safely be assumed that Senator Harding is well posted on the lime and limestone industry of Ohio and is one public man who is able to comprehend and appreciate the quarry business and its problems.

Senator Harding has proved himself a real friend of the good roads builders and promoters of Ohio. Both A. P. Sandles, secretary of the Ohio Macadam Association, the National Crushed Stone Association and the National Agricultural Limestone Association, and L. H. Hawblitz, president of the Ohio Macadam Association, are numbered among the senator's personal friends. Indeed, Ohio quarry men among his friends are many.

Senator Harding's secretary is George B. Christian, Jr., son of Col. George B. Christian, president of the White Sulphur Lime and Stone Co., and one of Ohio's pioneer lime manufacturers. Col. Christian was one of the first to introduce



Warren G. Harding



(Photos copyrighted by Edmonston, Washington)

Geo. B. Christian

lime into Ohio agriculture, where it has since become so essential.

While, of course, Senator Harding as a man of broad knowledge and experience, has many other sympathies, it will doubtless prove a matter of interest to limestone quarrymen generally that he is also a man who has some understanding of their game.

May Building Operations

BUILDING OPERATIONS in the month of May showed a decline of 19 per cent from the operations of the previous month, according to statistics compiled by F. W. Dodge Co. According to this company's figures, contracts awarded during May in the territory east of the Missouri and north of the Ohio Rivers amounted to \$247,186,000, compared with over \$300,000,000 for the months of March and April.

This slackening of activity can scarcely be more than temporary. Its principal causes are four: Disputes over adjustments in the wage scale, principally in Chicago and the Central West; freight congestion, which is felt principally in the East; the increasing difficulty of financing building operations, and the belief that prices of materials are due to drop.

These factors, though they seriously handicap building operations, can scarcely be of more than temporary nature. The problems of wage adjustments and freight congestion may be solved very speedily. The difficulty of financing building projects, while it is great is not insurmountable. The public has already begun to see that declines in commodity prices can only be slow, at best, and it will soon realize that, in face of the enormous demand for construction of all kinds and the prospect of increased freight rates, building materials are likely to remain high longer than any other group of commodities.

The outstanding factor in the building situation, which overshadows all the difficulties and disturbing elements, is the accumulated demand for buildings. During the first five months of 1920, the F. W. Dodge Co. reported contemplated and projected work amounting to two-and-one-half billion dollars, as against contract awards amounting to one-half that.

Protest Freight-Rate Boost

Sand, Gravel and Crushed-Stone Men Appear Before Interstate Commerce Commission at Washington

OWING TO THE FACT that the coal operators had many family quarrels, which they chose to thrash out at the hearings of the Interstate Commerce Commission on the proposed 25 to 33 per cent advance in freight rates, the Commission did not get around to hearing the pleas of the mineral aggregate industry until late Friday afternoon and Saturday morning, June 18 and 19, instead of Thursday, June 17, which was the date originally set.

The delay compelled the officers and some of the directors of the National Association of Sand and Gravel Producers and the National Crushed Stone Association to remain in Washington the whole week. However, the delay gave an opportunity for numerous conferences, so that when the case of mineral aggregates finally came up, there was hearty co-operation and friendliness between the representatives of the two associations, and although each saw fit to present its own case, this was so done that each backed up the pleas of the other. The crushed-slag industry was not represented, collectively.

Advisory Council of Gravel Men

On Tuesday there was an all-day session of the advisory council of the National Association of Sand and Gravel Producers. The following representatives of the industry were present: V. O. Johnston, Lincoln, Ill., president of both the Illinois and National Associations, presiding; E. Guy Sutton, business manager of the National Association; Harry Donnelly, Ohio Sand and Gravel Producers' Association, Cincinnati, Ohio; W. P. Carmichael, Indiana Sand and Gravel Producers Association, St. Louis, Mo.; Floyd Goodrich, Iowa Sand and Gravel Producers Association, Humboldt, Iowa; Alex W. Dann, C. C. Whiteside, E. Brooker, Charles Donley and Joseph Hoeveler, Pennsylvania Sand and Gravel Producers Association, Pittsburgh, Penn.; Hugh Haddow, Jr., Millville, N. J.; R. C. Fletcher, Iowa Sand and Gravel Producers Association, Des Moines, Iowa; Ben Stone and Frank E. Lane, Illinois Sand and Gravel Producers Association, Chicago, Ill.; O. C. Hubbard, Wisconsin Mineral Aggregate Association, Milwaukee, Wis.; John Prince, Missouri Valley Sand and Gravel Producers' Association, Kansas City, Mo.; A. E. Schellberg, Nebraska Mineral Aggregate Association, Omaha, Neb.; John

M. Settle, Louisville, Ky.; Charles L. Ruffin, Richmond, Va.; and S. A. Fones, Joplin, Mo.

At this meeting O. P. Gothlin, attorney for the National Association laid his plan of action before the board for approval. It was decided to tie the open-top car shortage into the argument wherever possible, which was successfully accomplished.

Car Shortage Discussed

Experiences were exchanged on both the car and coal shortage problems, with the pretty general conclusion that the coal operators were playing the pirate to perfection and were not only unjustly depriving other industries of the use of open-top cars, but holding up all purchasers of coal in a most shameless manner.

Owing to the chaotic condition of the railways and industrial affairs generally there did not appear to be much hope of early relief. The sand and gravel men, however, had the gloomy satisfaction of knowing that the big and powerful steel industry is in almost the same kind of a boat, as regards getting service from the railways. The statement was made (which has subsequently been verified by "Iron Age," June 22, issue) that hundreds of thousands of rolled steel was being piled in the open at mills in the Chicago, Youngstown and Pittsburgh districts for want of open top cars to make shipments. And the all-powerful steel men have got just about as much satisfaction from the Car Service Commission and the Interstate Commerce Commission as the sand and gravel men have.

The car situation is so desperate at all points west of Pittsburgh that the expediency of shutting down every sand and gravel plant for a period of three weeks or a month was informally discussed; and idea found favor with many operators.

Gravel and Stone Men Get Together

On Wednesday, June 16, John Rice, president of the National Crushed Stone Association, and V. O. Johnston, president of the National Association of Sand and Gravel Producers, had a conference at which it was agreed that the present problems of the two industries were identical and that each would endeavor to strengthen the case of the other before the Interstate Commerce Commission.

Besides Mr. Rice the following crushed-stone men were present in Washington and assisted in preparing the case for the industry: A. P. Sandles, secretary of the National Crushed Stone Association, Columbus, Ohio; F. W. Schmidt, Morristown, N. J.; L. H. Hawblitz, Toledo, Ohio; E. J. Krause, St. Louis, Mo.; A. J. Sullivan, Chicago, Ill.; H. B. Allen, Philadelphia, Penn., and F. T. Gucker, Norristown, Penn.

The crushed-stone men agreed to employ H. S. Burchmore, a traffic expert of Chicago, Ill., to advise them at the rate hearing. Through subsequent meetings the crushed-stone and gravel men became acquainted with the arguments to be advanced by each and adequate preparations for the hearing were made.

The Rate Hearing

O. P. Gothlin, attorney for the National Association of Sand and Gravel Producers, opened the case for the mineral aggregate industry on Friday afternoon with a strong array of arguments to show why freight rates on sand and gravel should not be increased. He was not allowed to finish, as the Commission ruled that was not the time for argument, but for the submission of facts and statistics.

Mr. Gothlin then put the following witnesses on the stand: V. O. Johnston, W. P. Carmichael, and E. Brooker. Mr. Johnston's opening wedge is printed on the succeeding pages of this issue of Rock Products. It created a distinctly favorable atmosphere for the testimony which followed. The other witnesses submitted tabulations to prove the effect of General Order No. 28 on sand and gravel freight rates.

On the following Saturday morning John Rice went on the stand, his testimony being brought out by cross questioning by Attorney Burchmore. Mr. Rice showed quite conclusively how the crushed-stone industry was linked up with the railways in the matter of ballast supply and why an increase in freight rates would decrease the production of various plants and consequently add to the price of ballast. Mr. Rice had his letter of April 15 to the Interstate Commerce Commission, in regard to freight rates, made a part of the record of this hearing. (This letter was published in Rock Products, April 24, 1920, p. 21.) Practically all of his testimony at the

hearing was to substantiate those points.

Mr. Rice stated principal uses of stone. He recognized need of greater revenue for efficient service on part of railroads. He said: "Stone men are willing to pay their full share of freight rate burden. We ask equity. We do not want to pay our share and part of the other fellow's." He stated summaries from freight rate reports showing following facts:

Average car load and lading.....	49.5 tons
Average per ton freight rate.....	85.1 cents
Average earning of stone per car mile 91	cents
Average earning per ton mile.....	1.83 cents
Average earning per car of stone.....	\$42.10
Average mileage haul of stone.....	46.5 miles

Mr. Rice said: "We believe these fig-

ures are correct. If they are, the average earning per car mile and per ton mile is considerably above that average earning on commodities other than mineral aggregates. The risk to the railroads in moving stone is a minimum. The short haul and the short time required gives carriers a chance to use the cars for more frequent lading.

The Commission asked:

"Mr. Rice, what do you consider a fair price for stone?"

Mr. Rice: "On an average, 90 cents to \$1 per ton."

Commission: "What do you consider a fair profit on crushed stone?"

Mr. Rice: "I would be glad to get an average of 5 cents per ton."

Mr. Rice stated that an increase of 30 per cent on freight rate would add from \$1,000 to \$1,500 per mile on road building.

The Interstate Commerce Commissioners listened to all the testimony of the mineral aggregate men with apparent interest and genuine attentiveness. It is certain that they have a much clearer comprehension of the industry than ever before, and there is every reason to believe that the way has been paved for a fairer treatment of the industry, both in the matter of freight rates and car service as well.

Keep Up Fight for Car Service

V. O. JOHNSTON, president of the National Association of Sand and Gravel Producers, writes in a general letter to the membership under date of June 25:

"I have just returned from Washington, where I had, in company with Mr. Sutton and other officers and members of the Association, a most unusual opportunity of sizing up existing conditions. The rate hearing was important, and we left well satisfied with the showing we had made, feeling that whether immediately successful or not, we had been instrumental in securing for our commodity rates more nearly commensurate with the averages of others than we otherwise would have had.

Car Supply Biggest Factor

"Everyone felt, however, that the matter of car supply at this time overshadowed everything else, and especially after the priority order issued by the Commission in favor of coal, we were confronting a situation fraught with most serious consequences—not only to our own, but to all the construction industry. We had many conferences with railroad and shippers associations, officials and secretaries of other associations, traffic experts and government employees; we heard much testimony as to conditions throughout the country, and we have had opportunity in traveling to make personal observation of railroad conditions, especially with reference to coal. There is but one conclusion possible in view of all the testimony, and that is, that this reconstruction seems to have started by going backward. Transportation facilities are sadly demoralized as to equipment, finances and labor. Financial conditions throughout the country are far from stable. Industry generally is very slow in getting on a peace-time basis. Labor is indifferent to its place in industry and inefficient.

"I left Washington after reading the

priority order issued by the Commission in favor of coal. This action was so unexpected and seemed, in view of all conditions, so unnecessary and unwise and so serious a blow, not only to us, but to all construction industry, as to fully warrant the opinion shared by those present, that our fight for a fair share of transportation had only begun. It seems incredible that the action taken was based on full knowledge of the facts and was made with any foresight as to its inevitable consequences. Everyone admits that the railroads have fallen down under the burden placed upon them, and there seems to be no really constructive, intelligent effort to remedy the situation. I am no pessimist, nor do I desire to alarm the members of our industry who look to me for information, but I do take it as part of the duties of my office to advise you of the facts which we must face, and impress upon you as never before the necessity for co-operation.

Sutton Constantly on the Job

"Mr. Sutton will remain in Washington indefinitely. We had a sizable delegation from all parts of the country present during the rate hearing, and we pulled every available string to secure more attention to our need for cars. We have been in touch with the Senate Committee on Reconstruction; we have talked to different members of the Commission on Car Service; we have had an opportunity to observe and pattern after the methods of the National Coal Association; we have had the active support of the Portland Cement Association; we are endeavoring to enlist the co-operation of the National Federation of Construction Industries; we have had advice on and considered the feasibility of court proceedings. We have come to realize that there is much ignorance with reference to our products and their importance in the industrial world, and that, regardless of immediate results, we must conduct a campaign of publicity and education.

General Conference at Washington

"We are now planning for a general conference of representatives of construction industries at Washington. We are also arranging for a special hearing before the full membership of the Interstate Commerce Commission. We are co-operating with state highway officials, with the Federal Bureau of Public Roads, contractors' associations and many others. Without going into detail, which would take an undue amount of space, we have been keeping things hot and are far from the limit of our resources yet. Everyone conversant with the facts feels that we must fight, and fight vigorously at this time or not at all. A month from now will be too late.

"We need the active co-operation of every producer in the country. I am satisfied that if each one knew the situation, he would not hesitate to align himself with us. Up to date the burden has been carried by a comparatively small per cent of the producers, and unless the producers generally get in line, our efforts will be crippled and all will suffer accordingly. This is not a time to quibble about a little effort or money. If those of us who know the facts consider it to our interest to donate our time and considerable money, why not take our example as a guide for your own actions? Some have already been generous in their support; the big majority, however, are still holding back. I am satisfied that if this attitude continues, it will cost you hundreds for each dollar you withhold at this time.

"We ought to hear by wire and letter from every producer to whom this communication goes, stating just what conditions are at his plant, and enclosing a substantial check, with the promise of more if needed. If you will do this, we will be able to give you big value for your money. If you fail to do it, the consequences are yours.

"Address me in care of Washington Hotel, Washington, D. C."

Interstate Commerce Commission Posted on Uses of Sand

Commissioners Put in High Good Humor at the End of a Dry, Hot Day by President V. O. Johnston of the National Association of Sand and Gravel Producers

BE THE INTERSTATE COMMERCE COMMISSION judge or jury, or both in one, at least it is made of human beings. Consequently, after several weeks of hearings in Washington's sizzling summer weather, listening to interminable reams of facts, statistics and the ramblings of scores of witnesses, representing every industry and commodity in the length and breadth of the land, the very human commissioners were really relieved, refreshed, entertained and instructed by the following classic, presented on behalf of the sand and gravel industry by V. O. Johnston, president, of Lincoln, Ill.

So it isn't to be wondered at, owing to the general good feeling and sympathy aroused in that august body, that a member of it should recall the little verse of General Horace Porter (on the opposite page herewith) and send it to Mr. Johnston to know if he had not omitted one use of sand! But putting all humor aside, there is no question but that Mr. Johnston made a most favorable impression on the Commission and most excellently paved the way for the witnesses who subsequently presented dry facts and figures in behalf of just and equitable freight rates for sand, gravel and crushed stone.

Mr. Johnston's Address

Mr. Johnston said:

"The sand and gravel industry is one of whose conditions the general public has but a most meagre knowledge. Possibly for that reason, and because it also is an industry of comparatively recent growth, it has not had that consideration and interest on the part of public bodies to which it is entitled or which has been shown other lines of commercial activity. Its plants are owned largely by individuals or small corporations and consist of many scattered units, isolated in their locations—usually in creek bottoms, river banks, hillsides, or prairies—wherever the hand of nature or the vagaries of a glacial ice wave may have deposited available material.

"The owners and operators of these plants are often, if not usually, remote from large industrial centers and deprived of the advantages of close association with each other and contact with other business men, and are, in a large measure, pioneers in a calling which involves intimate acquaintance with dirt and grit and grease, long hours, battles with wind and rain and hazards of unusual degree.

"Its products, nevertheless, are essential in practically every form of construction and their use so closely and vitally interwoven with that of many others and so important in the development of our country and the furthering of its industrial welfare, that I do not hesitate to claim for sand, and in almost equal measure gravel,



a consideration from this Commission and our friends, the railroads, second to none of those being presented here. This is a broad statement and one well calculated to draw vigorous challenge, but it is made in deliberation and sincerity and with full knowledge of the facts—to which in more detail your attention will be called in our other testimony and exhibits.

"Close-Up" View of the Industry

"In the few moments at my disposal I shall endeavor to give you what might be called a "close-up" view of our industry, a somewhat intimate but composite picture of our business as related to the purpose of this hearing, in the confident belief that

such a viewpoint will be of real benefit to you in weighing the claims, facts, and figures presented with reference to freight rates.

"Sand is the most widely scattered and most abundant of all our mineral deposits. Nearly every state in the Union has a large available supply—some of them, in fact, being nothing much but sand—few localities but have some supply although of no great commercial value. Consisting as it does of particles of rock, of widely different chemical analyses, disintegrated through the ages by forces of water, ice, heat, chemical action, and other agencies, carried long distances often by water and glacial movements, it is found deposited quite generally over the surface of the earth and in an infinite variety of formations.

"This condition accounts for the fact that it moves as freight on comparatively short hauls. This condition also has made its marketing a highly competitive matter, and it also explains the fact of its value being less than that of any other commodity of any general use. 'Cheaper than dirt' is a homely and expressive phrase, but that is exactly what sand is in many cases. In all except strictly rural districts, one can buy a yard of sand for his driveway for less money than the same amount of dirt for the lawn adjacent.

"From a mining standpoint sand is comparatively easily accessible, yet its production entails problems which have a distinct bearing on this issue. The extreme variation in deposits—under water, both still and active; in hills, far from water for washing or making steam; in glacial drifts and preglacial valleys; usually mixed with gravel, boulders, clay, lignite, and other foreign matter which must be removed to produce a marketable product; often overlaid with silt, rock, slate, or top-soil which must be removed to get at the sand—has precluded the use of any uniform method of excavation.

"Each deposit under its peculiar conditions is a law unto itself with reference to economical methods of working—as many an operator has found to his sorrow in the development of his plant. Washing and screening processes have had to be developed and adapted to local and often unusual conditions. Plants have had to be designed and operated under widely varying conditions as to location, fuel, or power supply, labor and transportation. For these

reasons, it has not been an industry which has appealed to capital or captains of industry. Consequently, many of the pioneers in the industry were without broad business experience, lacked technical and mechanical training as well as adequate financial means, and gained whatever success they have had despite great hazards and heavy handicaps.

Immense Growth of Industry

"Under these conditions, or possibly, I should say in spite of them, the industry has grown—in response to an insistent and ever-increasing demand—until today it is filling an important and vital need in our national construction program. More than 1,000 plants are scattered throughout the United States today whose combined annual output approximate 62,000,000 tons of material, having a total value of nearly \$38,000,000. (These figures are taken from the United States Geological Survey for 1918, the report for 1919 not being yet available.

"That 1918 was a war year and production was greatly curtailed, both on account of labor shortage and war-time restrictions on transportation and especially on the use of open-top cars. (Amounting to about 44 per cent as compared with production for 1916). During that year, as a war measure, a flat increase of 20 cents per ton was added to our rates, a burden we were able to bear, in addition to what the short production of that period meant to us, as will be developed later, only as a matter of patriotic duty, meaning as it did an average advance of over 40 per cent on our products as compared with 25 per cent on others.

"On an estimated average freight rate of 70 cents per ton, our industry showed a revenue to the railroads of over \$43,000,000 during that year. The value of the industry, however, should not be judged entirely by the tonnage produced or the revenue created, nor can fair weight be given its claims by estimates of the amount of money invested in it or its importance as an employer of labor, sizable as these are. Rather, is its value best illustrated by reference to other industries directly and vitally dependent on it.

Some of the Uses of Sand

"A brief survey of the uses to which sand is put is not only surprising to those who have not given the matter attention, but confirms the contention of its being a basic and essential product in the construction industry. For instance, lime without sand will not make mortar; cement without sand will not form concrete; brick cannot be laid without sand; in building, lumber rests on concrete foundations requiring sand; glass is largely sand.

"In most modern bridge and building construction, steel is covered with and protected by concrete, requiring sand. Coal mines use large quantities of sand—underground haulage motors requiring engine

sand; sand is necessary for under-ground concrete work; top works rest on concrete foundations requiring sand. Concrete is fire, water and rot proof and not only in coal but in copper, iron and other mines, is replacing wherever possible all props and timbering formerly made of wood and thus increasing the demand for sand.

"The railroads of the country at the present time are being operated to the extreme limit of their capacity, and anything having to do with their maintenance or operating conditions is a matter of vital importance. Few realize, however, that not a locomotive starts without the use of sand—engine sand—piped to the rail to avoid slippage of the drivers.

"During the year mentioned, later figures not being available, in addition to large quantities produced by the railroads themselves from their own pits, there was produced and sold to them for this purpose alone, 1,462,465 tons of sand. In the same year the railroads purchased over 8,000,000 tons of sand and gravel ballast—and at

**"PROVIDENCE sends the
wicked wind,
That blows our skirts knee
high,
But God is good and sends the
SAND,
That sticks in the bad man's
eye."
(Gen. Horace Porter)**

that, most of them were not buying any more than was absolutely necessary. Bridges, piers and docks require sand in their construction; warehouses, roundhouses and stations cannot be built without sand. Foundations for interlocking plants and signal devices, freight and passenger platforms, made of concrete, demand sand.

"Steel foundries require sand for the simplest casting. When made, the castings are cleaned with blast sand. The machinery for polishing, fitting and assembling these castings rest on concrete, made of cement, coarse aggregate and sand.

"The country is now entering on a program of hard road building, surpassing in both mileage involved and the amount of money to be expended, that of the largest five-year period of railroad building by about 150 per cent. Again sand—whether the road be of brick or concrete. Even the farmer calls on the sandman for assistance in producing and storing his food crops. Sand for his hog and stock-feeding floors, built of concrete. Sand for his silos. Sand for his barn and granary foundations. Sand for his concrete fence posts, water tanks, tile drainage and culverts. Sand for a concrete floor of his garage.

"There are many other uses for sand than those enumerated—furnace sand, sewage filtration and polishing sand, fire or

furnace sand, sand for reclamation, drainage and other work directly improving or increasing our farmable land. Sand is used in roofing, in floor cleaning, in polishing preparations and for making sand-paper. Further mention is unnecessary. A little consideration will convince the honest inquirer that sand is one of our most important national resources, for which there is no substitute, and deprived of which many of our most essential industries would be seriously crippled.

Tribulations of the Sandman

"After the sandman has weathered through the three or four winter months in which he has had no production and consequently no income, but during which he is usually at heavy expense in repairing, improving and extending his plant, he hires his labor, goes out after orders and prepares to start his plant for a season's run. *He then orders cars.*

"Were there time I would pause here in my remarks and ask for a profound silence to adequately illustrate the quiescence and watchful waiting that too often follow the act of ordering cars. During the war we ordered cars, more or less as a matter of form, with scant hope of getting a full supply and often did not get any, but when the local passed us by and our worst fears were realized, we cheerfully grinned and hoped it would be as bad a day for the enemy in France as it was for us at home. After the war, hope was renewed that we would be able to get an adequate supply of cars, but the situation was not much improved. After the return to private ownership, hope still continued, and we are even now looking forward to a day when our orders for cars will be taken seriously and there will at least be a probability that our needs will be taken care of.

"The importance of this matter of car supply and its effect in considering increased rates in our industry, cannot be too strongly emphasized. Not only the demoralizing effect on our own organizations and the inefficiency of hit or miss operation, but the interests also of our customers, contractors, truckers, teamsters, and the large army of labor, both skilled and unskilled, directly and indirectly dependent on a supply of sand, makes it not only a serious problem to those immediately concerned, but one of far-reaching consequence to industry generally, and not the least of those elements entering into the high cost of living.

Importance of Regular Car Supply

"Without a fairly adequate and regular car supply, economical operation of our plants and fair prices are impossible. A partial supply for an extended period or an irregular one, is often more inhuman than none, meaning a lingering financial death rather than a quick one. The reason for this lies in the fact that unlike most manufacturing and mining enterprises

where total costs of operating increase only in direct ratio to units produced, in our industry total cost of operation, whether for full or only part time, is largely a fixed amount. In other words, our operating expense, not only overhead and sales, but plant and labor as well, is practically uniform, regardless of our production.

"Our plants have to be manned and maintained so as to load promptly all cars received. We must always be ready for capacity production. Our labor must have steady employment during our short season if we are to keep them at all. We cannot, to any great extent, store material without heavy additional investment and a sizable addition to operating expense. It costs nearly as much to steam a dredge for a partial day's run as a full one. Most of our power rates are based on a capacity use of current and a lesser use increases the average cost per kilowatt hour, and means expense without corresponding revenue. To us, this matter of car supply is vital—it is the chief uncertain element in our business, and the only one over which we have no control.

Mending Cars for the Railroads

"One other factor in the production of sand, not common to other industries, is that of car-battling or cooerage. Having received a supply of cars, the sandman must put them in condition to load. In theory alone, the railroads do this for him. In practice, he receives cars unfit for loading and containing all manner of refuse.

"Having produced his sand free from all foreign matter so as to make it suitable for concrete or other uses, he cannot, in justice to his customer and his own reputation, contaminate it by loading in cars without cleaning them. He is put to the expense of sweeping and shovelling and conveying the refuse.

"He must then close all cracks in the bottom or sides of cars, to prevent leakage in transit. This often is no small job, requiring labor, straw, lumber or other material. General figures as to the cost of this are not available, but one producer recently reported for 1919 a total expense of \$16,557 in repairing 17,369 cars—an average per car of over 95 cents, equal to an additional tax of nearly 2 cents per ton on his annual shipment. Another plant reports an average cooerage cost of over 85 cents on an annual production of 4,300 cars, and I am safe in the statement that these costs are close to the average.

"Other freight, such as live stock, coal, lime, grain and cement, secures cars suitable to its safe carriage, but, especially during the past few years, sand has taken what it could get and borne the expense of fitting them for service. (It is worthy of note, in passing, that neither of the shippers mentioned filed a single claim for loss or damage in transit to its products.)

"I have endeavored to give you, gentlemen of the Commission, a brief story of

the production of sand, and trust it will serve somewhat as a back-ground against which the facts and figures presented by other representatives of our industry will stand out more clearly.

Hazards of the Industry

"In conclusion, I wish to call to your attention but one other phase of our business—that of the pecuniary reward accruing to an operator who has successfully avoided or overcome the hazards incident to the industry. From a mining standpoint, the sand industry is fairly comparable with that of coal, with the advantage in favor of coal by reason of its greater age, more efficient and uniform methods of operation, and more attractiveness to capital.

"Coal enjoys a longer season and a more steady market than sand or gravel. Coal has been able for many years to reach the ear of the public and governmental authorities and enlist their sympathy and co-operation through strong state and national associations, amply supplied with funds and forceful representatives; through its trade journals and other publicity media. Coal has been the basis of many fortunes—the coal baron, along with the steel baron and the lumber king, being pictured as fairly exuding wealth.

"But who ever heard of a sand king—or a gravel baron? Who ever charged a sand man with being the possessor of a swollen fortune, wrung from the necessities of the public? In the words of Bill Nye, or who ever it was who first coined the phrase, 'There ain't no such animal!'

"And there's a very good reason. Instead of an adequate reward for the gamble he makes with the hazards of his business, the producer of sand and gravel receives less for his product than would in these latter days be considered a fair profit on coal. Instead of prices ranging from \$3 to \$6 per ton at the point of production, sand and gravel averaged, during the year 1918, 61 cents!

"Sixty-one cents! Not per pound or per hundredweight, but per ton, of 2,000 pounds. Figures for 1919, when available, will doubtless show an advance of from 10 to 15 per cent over that, and 1920 a somewhat further increase, but at that, in view of the conditions surrounding its production, in view of its seasonal limitations and its restricted markets, to say nothing of its curtailed and irregular car supply, not even the wildest of all the wild I. W. W.—Bolsheviks—Reds, could accuse this industry of profiteering.

"I regret that the bare struggle for existence and the lack of funds for efficient and extensive co-operative activities has prevented the gathering of statistics to show the average profit or loss in the industry during the past few troublous years, but I do submit, without fear of successful contradiction, that a product whose mining and marketing is conditioned as has been outlined, yet sells for not over 75 cents per

ton, affords a mighty small margin for profit—and a most precarious basis for investment.

Freight Rates Should Be Adjusted

"If there is any weight to be given the argument advanced in this hearing, that the rate of freight which any commodity can or should carry, bears a more or less direct ratio to the market value of the commodity, it would seem that sand and gravel, instead of being loaded beyond the average of all other commodities, should yield a revenue considerably less than it now does, to say nothing of an advance, which would mean, roughly, an increase of about 13 per cent in the delivered cost, on cars, to the consumer.

"On the other hand, if it is a matter of loading the commodity with 'all the traffic will bear,' regardless of cost of transportation, we again call your attention to our 42 per cent war-time increase and submit that in the present condition of the industry at least, 'we have had ours,' and as a matter of justice should not have an added burden, at least until the existing discriminations against our products, whether by virtue of Order No. 28 or otherwise, are removed, by the raising of rates on many other commodities, now unduly low, as shown by our exhibits, to a just and reasonable level.

"In view of the low value of our commodity—not much more than the freight already imposed upon it—an increase of 30 per cent means either such an increase in the cost to the consumer as will greatly discourage the use of our products or the encouragement of other small local plants, within trucking distance of their markets. In either event the very purpose for which this increase is asked—the production of more freight revenue—will be defeated.

"Were we not firmly convinced of this and that no simple plan of passing the increase on to our customers and the ultimate consumer would avoid serious consequences to our industry, and result in no benefits to the railroads, we would not be taking the time of this Commission or spending our own in an effort to forestall what seems to us but little short of a calamity.

"Industrial conditions at the present time are none too stable. One of our greatest needs to remedy the trouble, as is well recognized, is to facilitate the efficient functioning of our transportation systems. None would profit more directly from such an improved state of affairs than we, the producers of sand and gravel. But we respectfully submit for your consideration the proposition that the burden should be borne, in the long run *must be*—fairly and equitably—that an injustice done one of the brotherhood of construction industries, will inevitably result in trouble for all, and mean, if nothing worse, a postponement of that day when industrial peace and prosperity will hover over this sadly befuddled land of ours and each shall have equal opportunity to share in its blessings."

Lime Men Hold Best Convention

Car Shortage, Prospective Freight-Rate Increases and Bituminous Coal Piracy Fail to Dim Faith and Enthusiasm—Reorganization of Association Unanimously Endorsed After Nine Months' Trial

NO FINER ENDORSEMENT of Charles Warner's administration of the National Lime Association could be possible than took place at the convention of the industry at New York, June 17 and 18, when the present tonnage assessments for maintenance of the National Association were doubled without a dissenting voice. Indeed, there was every evidence that the majority of the members were quite ready and willing to vote much more.

The Association begins its fiscal year July 1 with a budget well over \$100,000, based on assessments of 5 cents per ton, and with a splendid program for serving the lime industry of the nation. E. O. Fippin, who has served as acting secretary since October, 1919, so ably and energetically, was appointed permanent secretary and will divide his time with the agricultural department of the Association, of which he will also continue to be director.

Charles Warner, who has labored so faithfully to insure the success of the Association, was unanimously re-elected president. George J. Nicholson, of the White Marble Lime Co., Manistique, Mich., was re-elected vice-president, and A. H. Lauman, National Mortar and Supply Co., Pittsburgh, Penn., was re-elected treasurer.

Col. Cobb Presides

Owing to a temporary illness Charles Warner, president, was unable to preside at the opening sessions of the convention, and Col. C. W. S. Cobb, of St.

Louis, Mo., was unanimously chosen temporary chairman. Col. Cobb paid a glowing tribute to President Warner and the work he had done during the past few months. He also welcomed the coming of young men into the industry

is being attracted to the industry led to the expression of opinion that all lime manufacturers must put forth every effort to improve and develop their present plants, install labor-saving machinery and meet the increasing demands for lime.



Uniform Cost Accounting—Depletion

The most interesting phase of the discussion on uniform cost accounting dealt with the handling of depletion charges. The committee on uniform cost accounting reported in part as follows:

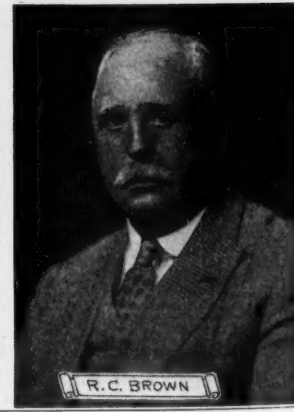
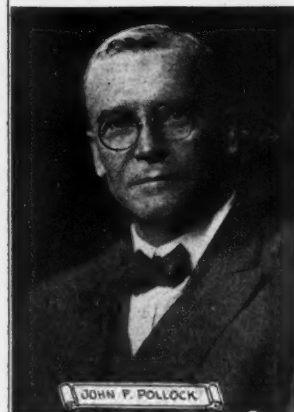
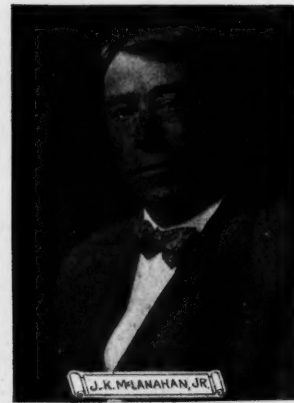
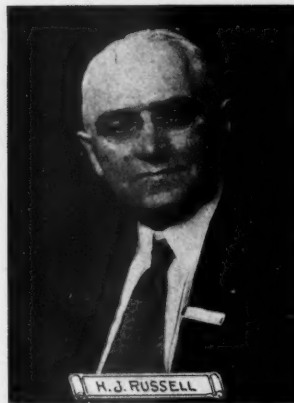
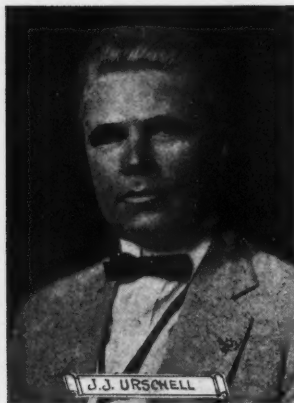
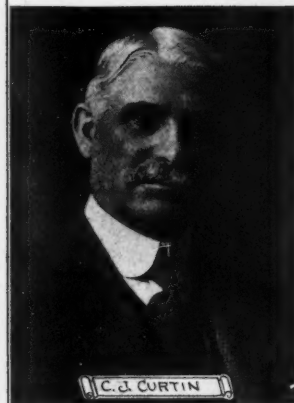
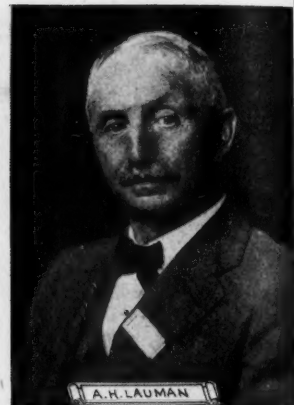
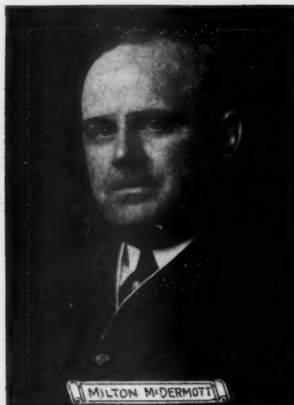
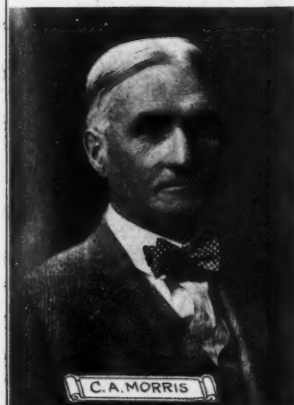
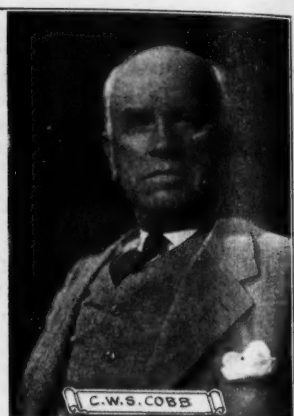
At the outset, we joined forces with a similar committee working for the cement industry and during the past six months have held several meetings and conferences in Chicago, Philadelphia, and Washington. Finally on Monday, May 17, two members of the Lime Committee attended a hearing before the tax department in Washington, which had been arranged for by the Cement Committee. A definite formula (hereafter set forth) was submitted tentatively to the tax officials present, but apparently was not acceptable to them. Negotiations have not however, been terminated, and we still have some little measure of faith that a modified formula may prove acceptable.

This recommendation we desire to submit for your consideration, namely, that

and painted a rosy future for the lime manufacturer.

President Warner's address, read by Secretary Fippin, is printed in the following pages. Those who discussed the points brought up by this address all expressed the greatest faith and optimism in the future of the Association and the industry. Evidence that much new capital

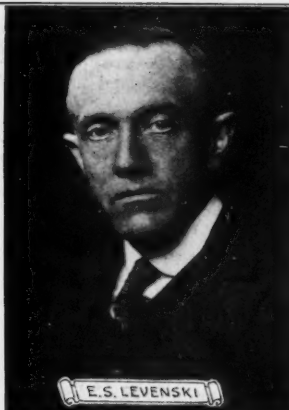
whether or not the attached formula be approved by the Internal Revenue Department, that member companies be urged to reconstruct their bookkeeping to the end that depletion charges uniformly be made in accordance with this scientific practice. There has been entirely too much self-deception in the matter of cost keeping and we doubt not that each one of you has witnessed the failure of some one or more lime-manufactur-



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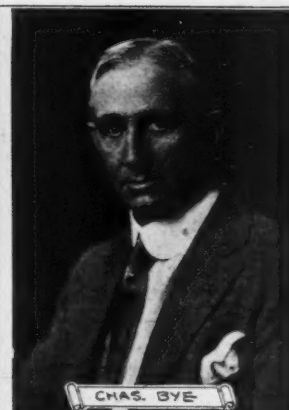
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E.S. LEVENSKI



MORGAN CURTIS



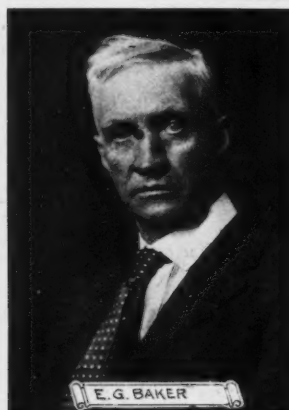
CHAS. BYE



GEO. D. VAN SCIVER



A.H. LAUMAN, JR.



E.G. BAKER



B.B. WILLIAMS



CHAS. R. LEO



HUGH McDONALD



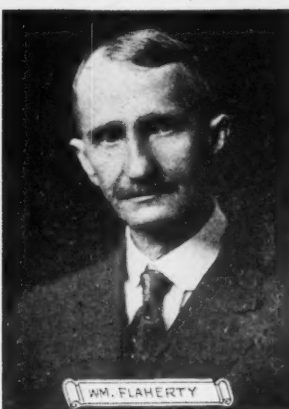
D.M. WITMER



V.M. FREY



E.E. EAKINS



WM. FLAHERTY



FRED WITMER



R.P. WILTON

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ing enterprises due to this form of ignorance or inexperience. There can be no success resulting from existing on one's capital. Nothing but failure ultimately will ensue.

Doubtless many of the member companies, if not all, have received from the Treasury Department, Bureau of Internal Revenue, Section of Non-Metals, the new schedule for valuation of deposits of non-metals, popularly known as Form "F." Doubtless it will be just as difficult to complete the information required as it would be difficult to sell real patriotism to an ex-service man who can see nothing but \$500 bonus money. Your committee questions the ability of any member company to supply all the information required and it might be said further that only a few will be able to supply any substantial part of the information. In this connection, we desire to point out that some manufacturers in other industries who have not claimed a deduction have declined to fill in Form "F." This may be properly questioned, as the schedule is for the purpose of determining invested capital (so much a factor in the excess profits tax) as well as depletion.

We believe, therefore, that each member company should exhaust every effort to answer the questions set forth in Form "F," especially so as any uniform method of depletion which your committee later may arrange for, will not save our members from the annoyance of preparing and filing this elaborate schedule. Member companies should have this in mind, however, that any data which may be obtainable in their respective vicinities relative to lime rock values on or about March 1, 1913, will be useful, especially if said values are real "fair values" and not ordinary farm land values. Royalty rates, actual sales of limestone lands, etc., are important factors in determining real "fair values."

Also note this, that the tax law protects the investor and the tax-paying corporation is permitted to set up or make such charges as will return to the investor (bondholders and stockholders), the amount of capital employed. Certainly this means that a member company will be allowed to charge off its plant and other equipment during the life of the stone deposit, even though said assets have been preserved in the best operating efficiency up to the last ton of stone. Of course, the factor of salvage value of removal of said plant to another deposit of stone (if feasible) must be taken into consideration. It may be generally admitted, however, according to the experience in our industry that the lime plant has very little value after its immediate stone deposit has been exhausted.

In conclusion, may we urge that the National Lime Association in annual meeting assembled, take appropriate action, urging Congress to relieve American industry from the complicated, unequitable and burdensome tax laws now existing.

The committee was comprised of the following members, A. D. Warner, Jr., of the Charles Warner Co., Wilmington, Del., chairman; W. P. Sabin, Ash Grove Lime & Portland Cement Co., Kansas City, Mo., and A. A. Wilson, Mitchell Lime Co., Chicago, Ill.

Depletion Formula Proposed

1. Developed tonnage on date of valuation multiplied by rate per ton of average net profit equals total expected realization.
2. Total expected realization divided by number of years during which realization is expected equals expected realization per year.
3. From expected realization per year subtract 6 per cent interest on book value of plant at date of valuation equals expected realization per year on mineral deposit alone.
4. Expected realization per year of mineral deposit multiplied by present worth of \$1 (using 6 per cent rate of compound interest) received annually over number of years as found by annuity table attached, equals present worth of total expected realization on date of valuation.
5. Present worth of expected realization divided by tonnage (used in 1 above) equals present value per ton on date of valuation.

Experience With Depletion Charges

Following the report of the committee various members gave the figures which they charged in their cost-keeping to depletion of their limestone deposits. These figures varied all the way from 2 cents per ton to 25 cents per ton (of stone). The most popular figure was 5 cents per ton.

While a value of 5 cents per ton for limestone fit to make lime seemed to many a very low figure it was pointed out that there are difficulties to be encountered with local tax collectors if high valuations are placed on the quarry property. It was pointed out that a depletion charge of 5 cents per ton for an average limestone quarry would mean a valuation of \$14,500 per acre, which the company might be assessed on for local real estate taxes.

Coal Shortage

The subject of coal shortage and high prices was brought up on the floor of the convention and various experiences were related. It seems that although practically every lime manufacturer has standing contracts for this year's coal supply at prices ranging from \$3.50 to \$4.50 per ton, hardly a single one is able to get shipments on these contracts at the present time.

On the other hand nearly everyone had had the experience of buying all the coal he wanted at \$8.50 to \$12 per ton. The coal operators allege car shortage, under-production and every other excuse for not fulfilling their contracts, but coal is invariably forthcoming if the lime manufacturer can or will put up the "present market price."

The "present market price" it seems is being fixed by foreign buyers. An instance was given where buyers for the Italian government are paying \$10 to \$20 per ton at the mines in this country, the same coal costing \$150 a ton in Italy,

after freight charges and exchange are taken into account. Naturally under these conditions foreign buyers do not quibble over \$5 or \$10 on this side of the ocean.

The prediction was made that coal would soon reach \$12 to \$15 a ton unless the U. S. Government placed an embargo on the export of coal until domestic consumers were taken care of. A resolution was passed by the association asking the government to issue such an embargo order.

The following members were constituted a committee to press the matter of coal supply for the lime industry: C. C. Bye, Charles Warner Co., Philadelphia, Penn.; E. R. Stapleton, Tidewater Portland Cement Co., Baltimore, Md.; C. I. Starrett, Kelley Island Lime and Transport Co., Cleveland, Ohio; J. King McLanahan, Jr., American Lime and Stone Co., Tyrone, Penn., and George B. Wood, Rockland and Rockport Lime Co., Rockland, Maine.

Uses of Lime

Statistics of the lime industry were discussed by Miss Edith J. Munsell, of the National Lime Association staff; Bernard L. McNulty, of the Mitchell Lime Co., Chicago; Henry M. Camp, director of the Eastern Bureau of the National Lime Association, and G. F. Loughlin, of the U. S. Geological Survey. The papers of Miss Munsell and Mr. McNulty are printed on succeeding pages. Mr. Camp gave adequate proof that the right kind of statistics were of practical value in the matter of getting car supply and in directing promotional work.

A use of lime in the electrolytic treatment of sewage has been developed in the last year or two. This use has already been described in a bulletin issued by the association, and the operating details were quite fully described in an illustrated lecture at the convention by L. R. Soule, chemical engineer of the Direct Oxidation Process Co., Philadelphia, Penn., which is exploiting this method of sewage treatment. Mr. Soule said that the use of lime was essential to the success of his process. This field requires about 600 lbs. of high calcium lime per 1,000,000 gals. of sewage treated. Later in the convention Charles Warner estimated that it would take 1,000,000 tons of lime a year to supply this need alone, if this method of sewage treatment were generally adopted.

Warren E. Emley, of the U. S. Bureau of Standards, made his tenth consecutive appearance on the program of the association with an interesting and instructive paper on the uses of lime in construction. This paper appears practically in full in the pages which follow. His paper was followed by a discussion from T. B. Shertzer, engineer of the



M.M. DEELY



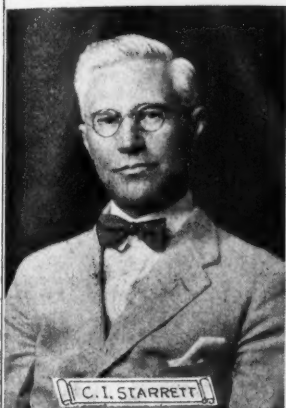
IRVING WARNER



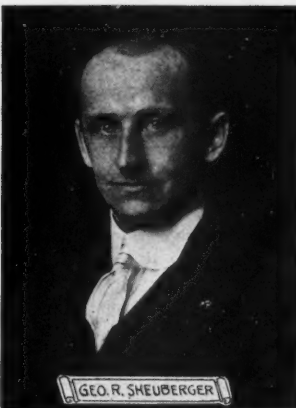
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W.E. HEALEY



C.I. STARRETT



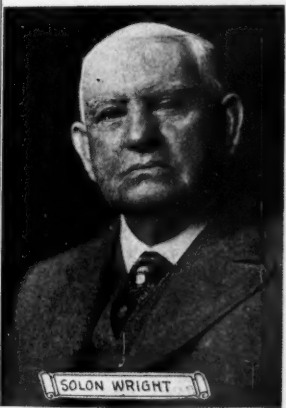
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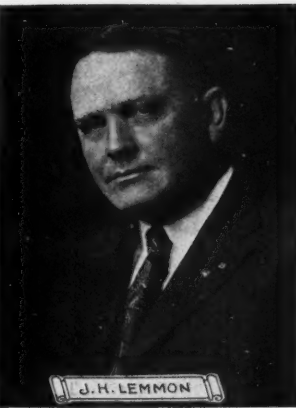
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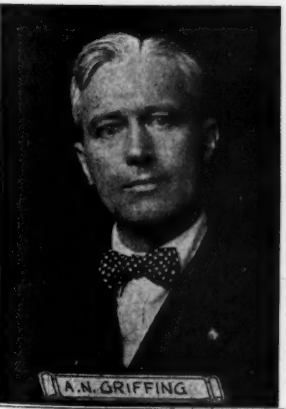
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M.E. REEDER



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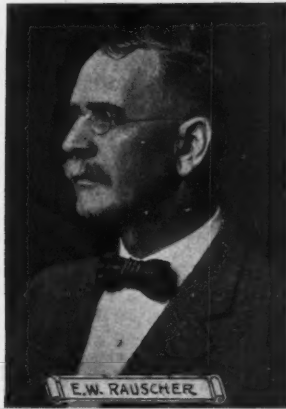
A.N. GRIFFING



JOS. C. ALDOUS



J.M. DEELY



E.W. RAUSCHER

Photos by Louvre Photo Studios, New York City

Eastern Bureau, who gave some instances of remarkable results with lime plaster properly aged.

One of the best summaries ever made of the use of lime in agriculture was presented by J. A. Slipper, assistant director of the agricultural department of the association. This is printed in full elsewhere in this issue.

Association Activities

S. P. Armsby, acting head of the chemical department of the association reported:

The efficiency of the chemical department and its value to the association depends primarily upon the ability it possesses in securing reliable information as to the uses and value of lime in industry and in disseminating this information in such a way as to promote a better understanding of the properties of lime and create a larger demand for it. Comparatively little progress has been made in studying fundamental problems involving the chemistry of lime and its reactions in various industrial processes and there is a tremendous field for the work of this department in improving rule-of-thumb methods now in use through a better understanding of the qualities and properties of lime.

In the light of past experience, it seems evident that constructive work along the two lines indicated above can best be forwarded by following such definite program of procedure in both securing and furnishing information which will be of benefit alike to the producer and consumer of lime.

The chemical department proposes to utilize the following sources of information:

- (1) Personal contact:
 - (a) Conference and correspondence with individuals who are in a position to know and appreciate the application of lime to various industrial processes.
 - (b) Inspection of industrial plants.
 - (c) Government agencies such as Bureau of Standards, Bureau of Chemistry and others.
 - (d) Study of literature touching uses of lime.
 - (e) Member companies and regional bureaus.
- (2) Association activities:
 - (a) American Chemical Society
 - (b) American Society for Testing Materials
 - (c) American Leather Chemists Association
 - (d) Manufacturing Chemists Association of the United States
 - (e) American Institute of Chemical Engineers.
- (3) Research Work:
 - (a) Fellowships or thesis work in colleges and other institutions.
 - (b) Investigations in the association laboratory. (It is proposed to conduct this laboratory as a separate unit, serving all three departments, and to have all proposed investigations passed upon by the Staff Committee before being undertaken by the laboratory.)

The following program of obtaining publicity for properly correlated information, secured as above indicated, should be undertaken so far as facilities permit.

- (1) Correspondence and Conference:
 - (a) With member companies and industrial concerns—calling attention to new developments, correcting bad practices and in general promoting the right use of lime.
 - (b) With individuals in responsible positions—having the same end in view.
- (2) Special articles for the trade press. These are in demand and will be prepared as time and available information permit.
- (3) Prepared lectures, illustrating various processes employing lime are valuable in securing publicity.
- (4) Paid advertising:
- (5) Printed Matter:
 - (a) *Manual of Uses of Lime*. This is now under way and will probably make a 60-page book which will be of considerable value to the lime industry if properly distributed.
 - (b) *Bulletins*. At least six 20-page bulletins of the type of Bulletin No. 200 (Lime in Sewage Treatment) should be prepared during the coming year. A number of topics are available.
 - (c) *Pamphlets*. These could be effectively used to focus the attention of Chemical Engineers on new developments with commercial possibilities.
 - (d) Re-prints and other publications.
 - (e) Re-prints of articles in trade papers.

Agricultural Department Work

E. O. Fippin, director of the agricultural department of the association, reported:

It is the desire of the staff of the Agricultural Department to continue its work along the same general lines that have been in progress during the past year.

The staff has been expanded by the additions of Professor J. A. Slipper and Miss Edith J. Munsell so that this work can be carried forward in a modest way, having in mind the two fundamental functions of our work, viz., first, to collect and digest scientific and practical information touching the uses of lime in agriculture. This means contact with many public institutions and agencies for investigation and education, both by correspondence and by personal conference; and second, the projection of this information into useful channels of publicity.

The first line of work must ever continue to be the source of inspiration, as well as ammunition, for our staff. We must know and be known to the persons in these organizations, and we hope to establish and maintain a spirit of thorough mutual confidence and co-operation, as has already been stated. We must recognize that much of our most effective educational work can be done indirectly through work of these public servants. For that reason one of our first publications issued has been the monthly *Agricultural Lime News Bulletin*, which seeks to be a clearing house of conservative, reliable, and up-to-date information touching the uses of lime in agriculture. It is not limited exclusively to this field since you will note that items on construction appear in its pages from time to time, but these always must be kept in a distinctly minor position. From the many letters that we have received it is clear that our bulletin is appreciated by a

large part of our mailing list. We would continue this *News Bulletin*, to be issued as promptly as possible on the first of each month. We have not been quite able to live up to our ideal in this respect.

Our trade bulletins are designed to deal with narrow, practical questions that are likely to arise in the mind of the farmer and in the trade. We have definitely limited these to four pages and aim to make them as concise and pointed as possible, each with an illustration of the subject matter. Our program calls for the issuance of one to two of these each month, and, therefore, a rather wide range of subjects may be covered. We have a list of over 50 titles at the present time and others continue to develop. We must depend upon our member companies for the actual use of these bulletins since we do not maintain any general mailing list to farmers.

In addition, we are accumulating a series of educational bulletins on agricultural lime which are culled from the regular publications of institutional men. Cornell Reading Course Bulletin 148, on the "Use of Lime on the Soil," and Ohio Bulletin 336, on "25 Years Summary of Experiments in Soil Fertility," and Dr. MacIntire's paper on "The Carbonation of Burnt Lime on the Soil," and incidentally on the destruction of organic matter by burnt lime, are examples of this type of publication, which we hope to continue to develop and make available both to member companies and to a wide public.

For the next year there are two special lines of additional work which it is hoped to develop, viz., first, the preparation of sets of educational charts that may be distributed to county agents, teachers of agriculture in high schools, and similar offices; second, lantern slide sets of similar character, and made available to the same agencies. We believe that by these means a larger public can be reached effectively than in almost any other way because our own work is multiplied by as many offices as use our material.

We are endeavoring to keep a close oversight of all current publications in order to get the public reflection of its attitude on the use of lime in agriculture. We also aim to prepare special articles for the trade press and incidentally to make corrections of erroneous statements by other writers wherever possible.

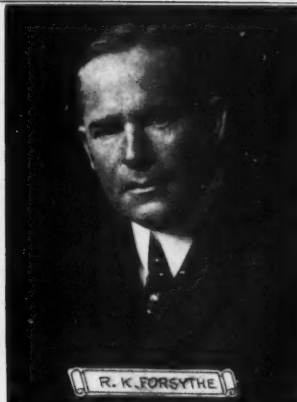
Supplementary to the work through the printed page is the personal work by means of lectures and personal conference. We believe that this should always be kept secondary to work with the printed page. However, it is the judgment of the staff that they should hold themselves available for lecture engagements for the larger groups of state and national character. They will welcome any contacts for this purpose that may be made by member companies and will meet these in so far as time and facilities will permit.

The work already started and accomplished is our best illustration of the things we propose for the ensuing year. We expect to carry forward essentially the same program and in much the same manner.

Finally, we must emphasize the need of the association co-operating with public agencies in investigation of the uses of lime. While we have much material for educational purposes, there are still large gaps in our fundamental information. Only on the platform of the soundest possible information can we expect to build public



S.W. STAUFFER



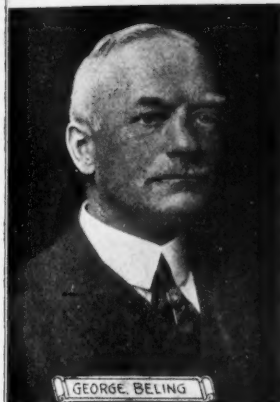
R.K. FORSYTHE



R.K. MEADE



W.E. EMLEY



GEORGE BELING



H.D. PRATT



W.M. COOK



L.H. HARTMAN



R.C. PARKER



T.B. SHERTZER



J.S. OWENS



HENRY M. CAMP



E.O. FIPPIN



W.A. KIBBEY



S.F. ARMSBY



J.A. SLIPPER



Members of the convention on the roof of the Hotel Astor

confidence and we must join with them in approaching the gaps that are clearly evident to most of us who have specially followed this field of investigation. I must emphasize to you the necessity of supporting in a reasonable way co-operative investigations with selected institutions, and if we do not join in such co-operation, we shall sooner or later be open to challenge of good faith.

I trust that in the budgets that are made up later in this convention provision will be made for the support of investigations, not only in our own department of agriculture, but equally in the departments of chemistry and construction, where fundamental information is quite as meager as it is in many parts of our own field as has already been developed in some of the discussions in this convention.

This then is our program to continue the established lines of publicity work, the extension of these particularly in the detail of sets of charts and lantern slides, the expansion of our personal contacts and our publicity work through special articles and lectures and, finally, the development of co-operative investigations.

Development of District Work

The discussion of promotional work in those districts where the production of lime is not large enough to finance a separate district organization was discussed fully and with evident general satisfaction. It will be remembered that this was the big bone of contention at the October meeting.

The work of the Eastern Bureau, described by its director, Henry M. Camp, left no doubt as to the profit to be derived by intensive local promotional work. The Eastern Bureau has gone so far as to card index every farm in its territory and to show on the cards the crops to which these farms are planted and their approximate lime needs.

T. B. Shertzer, who has recently completed an extensive tour of all the Middle West States, north and south, gave a most optimistic view of increasing interest displayed by highway engineers in the use of hydrated lime in concrete. He said that intensive district work was absolutely essential to establish those personal contacts and friendships which were so important in finally driving home the issue.

William E. Carson, president of the association for 14 years, outlined the difficulties to be met with in the South where there are no large cities to speak of, where much lime was sold to small customers even as little as one carload a year. Mr. Carson believed that the most feasible solution of the problem of promotion in this section was by printed literature from the central office.

After full and complete discussion of the problem in all its phases by Messrs. Thomas Black, R. C. Cheney, B. L. McNulty, R. C. Brown, H. Dittlinger, C. I. Starrett and others, it was decided that it was perfectly feasible for the central organization to employ field men whose time should be divided between such districts as would underwrite their salaries for the specific time they were employed in these districts. Such field men, while under general instructions of the headquarters office, would temporarily carry out the promotional plans of the district organizations.

President Warner emphasized the need of some kind of a district organization and the advantages to be gained by frequent district meetings. He admitted that there might be a need for more centralization, that in the desire to develop

the districts intensively the pendulum had possibly swung too far, but he believed that the association was on the right track and that things were fast shaping themselves to give everybody the maximum benefit from association membership.

Lime Men Registered at the New York Convention

Joseph C. Aldous, Mississippi Lime & Material Co., Alton, Ill.; S. P. Armsby, Technical Asst. in charge Chemical Dept., National Lime Association; E. G. Baker, Ohio Hydrate & Supply Co., Woodville, Ohio; L. C. Barrick, S. W. Barrick & Sons, Woodsboro, Md.; D. K. Bartlett, Electric Bleaching Gas Co., 18 East 42d St., New York City; W. V. Bartlett, Longview Lime Works, Birmingham, Ala.; Edgar T. Belden, Vermarco Lime Co., West Rutland, Vt.; Knickerbocker Lime Co., Finance Bldg., Philadelphia, Pa.; T. P. Black, Black White Lime Co., Quincy, Ill.; John Bower, Jr., G. M. Bushey & Sons, Cavetown, Md.; J. R. Blum, Limestone Development Corp., 92 Lafayette, New York City; R. C. Brown, Union Lime Co., Oshkosh, Wis.; Charles Bye, Charles Warner Co., Wilmington, Del.; Henry M. Camp, Eastern Bureau, National Lime Assn., Washington, D. C.; W. E. Carson, Riverton Lime Co., Riverton, Va.; R. H. Carter, chemist, National Lime Assn., Washington, D. C.; C. W. S. Cobb, Glencoe Lime & Cement Co., St. Louis, Mo.; Philip L. Corson, G. & W. H. Corson, Plymouth Meeting, Pa.; Morgan Curtis, Northern Lime & Stone Co., Petoskey, Mich.; C. J. Curtin, Farnam Cheshire Lime Co., 39 Cortlandt St., New York, N. Y.; Fred A. Daboll, Charles Warner Co., Philadelphia, Pa.; J. E. Davis, Charles Warner Co., Cedar Hollow, Pa.; H. Dittlinger, Dittlinger Lime Co., New Braunfels, Texas; J. L. Durnell, Knickerbocker Lime Co., Philadelphia, Pa.; E. E. Eakins, Charles Warner Co., Devault, Pa.; W. E. Emley, Bureau of Standards, Washington, D. C.; E. O. Fippin, secretary, National Lime Assn., Washington, D. C.; William Flaherty, Hoosac Valley Lime Co., Inc., Adams, Mass.; R. K. Forsythe, Thomasville Lime & Stone Co., York, Pa.; V. M. Frey, J. E. Baker Co., York, Pa.; A. C. Freeborn, Vermarco Lime Co., West Rutland, Vt.; H. A. Gawthrop, Merion Lime & Stone Co., Norristown, Pa.; A. N. Griffing, New England Lime Co., Danbury, Conn.; E. A. Grove, M. J. Grove Lime Co., Lime Kiln, Md.; Lawrence H. Hart, Engr., Construction Dept., National Lime Assn., Washington, D. C.; N. R. Healey, Rockland & Rockport Lime Co., Boston, Mass.; E. J. Heimerdinger, Louisville Cement Co., Louisville, Ky.; A. J. Huke, Rockland & Rockport Lime Corp., Rockland, Me.; W. A. Kibbey, Chief Clerk, National Lime Assn., Washington, D. C.; A. H. Lauman, National Mortar & Supply Co., Pittsburgh, Pa.; A. H. Lauman, Jr., National Mortar



Exhibit of the Eastern Bureau of the National Lime Association

& Supply Co., Pittsburgh, Pa.; J. Henry Lem-Gore, LeGore Combination Lime Co., LeGore, Md.; Charles R. Leo, Palmer Lime & Cement Co., New York City; E. S. Levensaki, Rockland & Rockport Lime Corp., Rockland, Me.; A. C. Mingle, Chemical Lime Co., Bellefonte, Pa.; William Morellie, Rockland & Rockport Lime Corp., New York City; Warner Moore, Moore Lime Co., Richmond, Va.; Wm. H. Moores, The Moores Lime Co., Springfield, Ohio; C. A. Morris, American Lime & Stone Co., Bellefonte, Pa.; McAlser Lime Co.; A. P. McCallie, Kelley Island Lime & Transport Co., Cleveland, O.; Milton McDermott, Knoxville Sand & Transportation Co., Knoxville, Tenn.; J. King McLanahan, Jr., American Lime & Stone Co., Tyrone, Pa.; Bernard L. McNulty, Mitchell Lime Co., Chicago,

Ill.; H. E. Nauss, Steacy & Wilton Co., Wrightsville, Pa.; E. L. Osborne, Ladd Lime & Stone Co., Cartersville, Ga.; Lowell M. Palmer, Palmer Lime & Cement Co., New York City; John F. Pollock, Ash Grove Lime & Portland Cement Co., Kansas City, Mo.; E. C. Potter, Vermarco Lime Co., Albany, N. Y.; E. W. Rauscher, Erin, Tenn.; J. G. Ray, Indiana Quarries Co., Chicago, Ill.; M. E. Reeder, Chippewa Lime Co., Muncy, Pa.; C. W. Reeder, Chippewa Lime Co., Muncy, Pa.; H. J. Russell, F. W. Wait Lime Co., Glens Falls, N. Y.; Harvey W. Smith, Charles Warner Co., Wilmington, Del.; J. A. Slipper, Assistant Manager Agricultural Dept., National Lime Assn., Washington, D. C.; George R. Sheuberger, J. E. Baker Co., York, Pa.; S. W. Stauffer, J. E. Baker Co., York, Pa.; R. N. Soper,

Pittsfield Lime & Stone Co., Pittsfield, Mass.; E. R. Stapleton, Tidewater Portland Cement Co., Baltimore, Md.; George D. Van Sciver, Knickerbocker Lime Co., Philadelphia, Pa.; J. S. Walker, Chemical Lime Co., Centre County Lime Co., Bellefonte, Pa.; Charles Warner, Charles Warner Co., Wilmington, Del.; H. B. Warner, Security Cement & Lime Co., Hagerstown, Md.; Irving Warner, Charles Warner Co., Wilmington, Del.; B. B. Williams, Marblehead Lime Co., Chicago, Ill.; C. W. Wilson, Charles Warner Co., Norristown, Pa.; R. P. Wilton, Steacy & Wilton Co., Wrightsville, Pa.; Fred Witmer, Ohio Hydrate & Supply Co., Woodville, Pa.; D. M. Witmer, Steacy & Wilton Co., Hanover, Pa.; G. B. Wood, Rockland & Rockport Lime Co., Rockland, Me.

Problems for the Lime Industry to Study and Solve

Address of Charles Warner, President of the National Lime Association, to New York Convention Opens the Eyes of Lime Men to Wonderful Opportunities Within the Grasp of the Organized Lime Industry

WE MEET AGAIN for our annual rally and convention under conditions both interesting and highly important to our country and our industry. As citizens of a great country and as active members of a highly important industry essential to our country's welfare, we have a responsibility which I know from personal contact with many of you, will be lived up to.

It has been proven time and again that the men of our industry are willing and ready to go over the top to the last ditch on national issues of importance both to the country and the industry.

We have but to turn back to a few pages of recent history covering our support to the war needs of our country and the subsequent peace needs of our industry to prove our loyalty and vision. While we have trials and tribulations ahead of us, due to many unsolved problems that will try men's souls, yet we are undoubtedly standing on the threshold of a decade of opportunity and development.

Many of us have had strong convictions of the bigger place that our industry can be made to occupy among the major industries of our country, else we could not have so courageously fought through the preliminary troubles of the past two years of babyhood of our new national effort. Only two years ago we took our first ambitious step. With the first year's experience it appeared to many of our members that we were a bit too centralized in our form of organization, that opportunity did not fully prevail for developing the latent interest of our members and to utilize their practical views on local as well as national problems. In fact, it was felt by many manufacturers that we should endeavor to develop a more de-centralized plan of operation for certain parts of our association work.

Some considerable difference of opinion, quite sincere on the part of both groups,

arose on the discussion of this broad policy. The majority decision favored the modification, and the revised plan was finally adopted less than nine months ago by a special convention of this national body.

You are all familiar through frequent communications and district conferences with the present general aim and policy of your Association in the conduct of its work. Whether in this readjustment the pendulum has swung a bit too far the other way to meet the views and needs of the membership in some sections of our country is a question for open discussion that should have thorough, sincere and honest consideration at this annual convention. The revision of our by-laws accomplished about nine months ago flexibly provides either for the direction of district work and issues by district committees, or its active guidance from national headquarters.

The budget needs for general and national work must, however, in all cases be carefully segregated from the specific expenses of field promotion in the district. The expenses for district work in each case, according to our present by-laws, must be provided for by special district assessment. Some districts are already in active swing utilizing their own forces as well as the active co-operation of the national organization in order that each part of our promotional work may be carried through from start to finish, i. e., from the inception and development of basic ideas and knowledge to its fruition in the enlarged and stabilized demand for lime.

Growth of District Organizations

Other districts after watching the work of the past nine months are now on the eve of launching their district organizations and field work with such measure of local directing responsibility as may be mutually arranged between the national organization and the specific district. Still

other sections of our country are without the local organizations to plant the seeds of knowledge and practical experience developed by our national body, in the minds of prospective customers.

Your president and staff have made repeated efforts through most sections of the country to bring around active work in all districts, believing in the fundamental importance to the membership in each section of the country of gathering together at frequent stated periods at some central point in their district to confer on the suggestions and literature issuing from the national organization and to advantageously apply these through their active use in district field work. Most all sections today are fully alive to this need, but in sparsely settled sections it is entirely probable that your national organization will be called upon and should render more active guidance in the field work, providing the members in such districts make the necessary special appropriations.

Do we need this work started more energetically in every section? Most decidedly yes. There is not one of you who can tell how soon the business pendulum of this country will swing back to the side of depression and reverse the condition now existing in most territories, from one of excess demand to one of over supply.

Now is the time to utilize a fair proportion of what profits we have, to nourishing the youthful plant that must bear us fruit when the drought comes, as it surely will come.

Wonderful Future in Agricultural Lime

Many interesting issues confront our industry. If, as many of us believe, our largest field for tonnage expansion, east and west, north and south, lies in the tremendous, growing and permanent need of lime on the soil, and if as has already been demonstrated in many sections the variety

of uses and better action of the burnt forms of lime offer, in the end, the most attractive product to the agriculturist, then to supplement our promotional work and to balance our plant operations, we face a problem of storage and warehousing which can well deserve our best attention.

The agricultural demands in most districts vary greatly with the seasons. This fluctuation in trade demand is so great as to overtax by at least two fold the present production in many sections of the country during the peak seasons, and to reduce the demand to a bagatelle during the dull seasons. With the usually active-demand seasons aggregating less than six months of the year, it can be seen how broad this problem is, how much it affects our profits, from low production and overhead expenses during the dull months, and finally and more important than all, how seriously it is prejudicing our standing as an industry in the eyes of the farmers of our country because of our inability to adequately supply their needs at the time they want lime products on the farm.

Both our pocketbooks and prestige are today as an industry suffering to a critical extent from this condition.

Must Provide for Storage

There have been spasmodic efforts involving temporary and abnormal arguments to the agriculturist, to take in lime at off seasons. This has not, however, provided any permanent relief. Our industry today must arouse itself if it is to build its position securely with the farmers of the United States by promptly meeting their seasonal demands. This situation is not without its effect on the prestige of our industry in supplying both the construction and the chemical users of lime. When the agricultural demand sets in, the reaction is detrimental in shortening the available supply to the construction and chemical fields and creating dissatisfaction there. Certain sections of our country which are yet young in the agricultural end of the lime business, but which in the next ten years will experience such a trade development as they little realize today if they but utilize our national force for farmer education, may not fully appreciate at this moment what this storage and warehousing problem means. But if we can take early steps to solve this problem in the territories now partly developed, we can, step by step, apply the solution to the newer sections of the country in the use of agricultural lime as their trade expands.

To meet this situation some companies have already developed considerable storage facilities at their points of production. This helps, but when the rush season hits such plants the rapid building up of additional labor crews to complete the processes of manufacture, and of bagging and loading the finished products, and the further problem of car supply, still seriously handicaps prompt delivery to the trade.

District Warehouses by Co-operative Effort

There may be several ways to improve this situation so that our industry can stand to the front as prompt deliverers of lime to the farming communities at needed times. For instance, it may be possible for individual manufacturers or a group of manufacturers collectively operating to organize a lime warehousing corporation, where group action could be arranged. Each subscriber to the stock of the warehousing corporation might be entitled to such proportion of the aggregate capacities of warehouses to be erected as his stock subscription would bear to the total stock subscriptions of all lime manufacturers.

Such a warehousing corporation should proceed to carefully study the principal market delivery points within the territory reached by the subscribing members, and then determine the best points for erection of warehouses and the proper capacities that each warehouse should have dependent upon the normal demand for lime products at each point. If the plan should provide for the manufacturer to hold and sell his own lime from warehouses when the season opened up, then no special sales arrangements would have to be made through and with the warehousing company; but if it should be deemed proper for the warehousing company to market the goods when the season demands start, then the individual manufacturers should sell their product to the extent of their percentage, to the warehousing corporation and ship to warehouses during the dull season on a price basis sufficiently under the prevailing market prices to allow ample profit and reserve to the warehousing corporation.

A proposition of this kind might be started in a relatively small way by erecting not more than six or eight warehouses in a certain field for a tryout, and then after getting a year's experience in the handling of the organization, it might be rapidly extended to cover the most important agricultural consuming districts.

You can all readily grasp the opportunity and advantages of a plan of this kind providing we can work out a fair and equitable basis of establishing such a joint warehousing problem. This arrangement should lead us to a vastly better condition of balance in production and shipping at the plants of those members subscribing to the enterprise. Such warehouses will also supply the farmers with his liming materials at his local shipping point, at such times as are convenient to him for hauling and spreading the material. I cannot help but feel that our members from the South and West will in the end be just as vitally concerned over the successful development of a warehousing problem as those of us in other sections who are already observing the effects of our serious fall-down in establishing permanently satisfied customers. It is hoped that a frank discussion of

this subject may help create a better situation.

Reorganization of the Association in Past Nine Months

In concluding this general report, I have one word to say of a personal nature.

I entered upon the work of the presidency of this association on October 1 last, with many misgivings, and a great load upon my heart because of the conditions that had apparently forced me into this position of responsibility. It is your duty to determine the results of these first few months of effort on behalf of the reorganized association. It has also involved much work in remoulding the old organization to conform to the new policy and the new budget.

After progressing part way through the last eight and one-half months, your directors became satisfied that with increasing costs and improving plans for the central office work we had cut our financial cloth a bit too short on October 1 last. It was a most loyal and gratifying experience to me to have the directors voluntarily propose to temporarily finance the deficiency for the plans of the fiscal year ending June 30, 1920.

It is up to the directors to recommend and to the convention to decide on the further extension of our work beginning with the new fiscal year, July 1, 1920. I can only state to you all in closing this short period of my official responsibility, that I keenly appreciate the loyalty, the support and the helpful suggestions, which have come from the membership in all sections of our country.

I sincerely hope that on the whole you will find this preliminary work accomplished to your general satisfaction. These results cannot meet with your full approval on all points, as they certainly have not fully satisfied me. But, considering the facilities available, we have made much progress as those who have carefully followed our work will unquestionably agree.

Work of the Lime Association Under Secretary Fippin

SINCE PROF. E. O. FIPPIN took over the management of the National Lime Association on March 1 some 18 bulletins, pamphlets, and reprints have been issued from the central office. All but six of these were new material and one of the reprints was very completely revised so that it is almost a new publication. These publications fall in the four groups, viz., 4 construction bulletins, 4 construction pamphlets, 1 chemical bulletin, 5 agricultural trade bulletins, 3 Agricultural Lime News Bulletins, and one pamphlet for the general promotion of association work. All of the publications in the first three groups were sent to special mailing lists that have been compiled by the Association staff.

The Use of Statistics by the Lime Manufacturer

Keeping Production and Distribution Balanced—Gaining a Knowledge of Lime Requirements

THE TRUE VALUE of statistical information, rightly and properly compiled and applied, are the charts by which the busy executive directs his organization and outlines the policies for the efficient and economical conduct of the business.

Few of us in the lime industry have applied statistical information in any form to our operation, and there are many today who have no detail of their business other than the balance sheets or statements, in some cases made only semi-annually or annually. As a cost-accounting system is the basis for an analytical survey of one's business, classified information coupled with this gives the accumulative results of detailed operation.

As lime manufacturers took more interest in statistical information, an effort was made by the Geological Survey to compile these figures more promptly, and give a preliminary report of estimated tonnage, to be made available soon after the first of the year.

For the intelligent direction of any business, it is necessary to have this detail at least once a month, and the effort and cost of compiling such statistics, more than pays for itself, for it directs the attention of the executives to those pitfalls which may be anticipated and guarded against, for just as history repeats itself, so commercial conditions are a cycle of events.

A business that is directed by one man who has the advantage of his experience in all the departments, and so long as that man is in active charge, the destinies of the business will be properly directed. As the business grows and other executives, specializing in departmental work are established, it is necessary for the successful conduct of the business, to keep the departments of production and distribution well balanced. Each must know what the other is doing.

Seasonal Demands Shown Graphically

Statistical information can well be applied to every department of a lime business. Production, as well as the distribution, varies with each season, regardless of whether one may be a producer of construction, chemical or agricultural lime. We know that it costs more to produce lime during the winter

By Bernard L. McNulty
Mitchell Lime Co., Chicago, Ill.

months than during the summer months. Climatic conditions have much to do with the operation of a lime plant, for there is so much outdoor work to be done.

If a comparative statement is compiled, showing the difference between the cost of quarrying limestone each month, we would soon have a better idea how to conduct and direct our efforts for the production of rock during the winter season. If we find that many days of rain, snow or cold weather during the winter period, reduces our production, we can take advantage of the spring, summer and fall months to accumulate a stock of stone in storage, to be used during the time it is impossible to work the quarry. In this way, the kilns are kept in constant operation which tends to lower production costs in that department, and at the same time, increase kiln efficiency.

Study of Lime Consumption

It is necessary for the sales department to know if one is getting a proportionate amount of business from the territory the plant serves. Such information should be compiled, at least once a month, first by the amount of tons shipped into the state, the county, or city (if it is large enough). From this information, it will be seen if tonnage is gained or lost.

Our industry has the advantage of a number of products—three great divisions being lime for construction, lime for chemical purposes, and lime for agriculture, so the distribution can be compiled in this order.

We know that the agricultural and the building business is seasonal, while most chemical trade is all-year-round, a steady business and governed by other commercial activities.

Statistical information shows the producer of agricultural lime just when the heaviest demand comes for the product, thereby enabling him to accumulate stock during the off season to take care of and provide for the trade during the greatest demand. Statistics tell whether the demand is greatest in the spring or in the fall, also indicates when the ma-

terial commences to move, and when to increase the working organization so that the greatest tonnage can be moved in the shortest possible time. These figures tell when to direct the sales and advertising campaigns, when to solicit business, and when to stop soliciting business. This same idea can and should be applied to the producer of chemical lime.

Guide to Advertising and Sales Promotion

The manufacturer, whose products are for the building trade, is guided in his solicitation of business by the statistics compiled for building construction. We know that a certain amount of building construction requires a percentage of lime. It is considered that 0.6 per cent of gross building permits represents the value of lime required. Therefore, by carefully watching reports on building permits, one can readily tell the approximate lime requirements, which is of vital importance in laying out a production schedule. The value of statistics, compiled and made available for each producer, can be of greater value to the industry as a whole.

Through our Association, by the use of statistics, we can develop a more intimate knowledge of the lime requirements, thereby govern the promotional activities of our staff to greater advantage. Each manufacturer, by reporting the monthly shipments, divided into the three classifications, would enable the Association to better promote the use of lime. If we reported the amount of lime used in each of the classifications, in each state, each month, we would soon have behind us valuable information showing the trend of distribution. Then, we would soon know whether or not we were making definite progress. If, for example, we found that the agricultural tonnage was not gaining in a given state, our Association or district office, or any manufacturers shipping into the state, could make an analysis of the situation and find wherein we were lacking and then decide what course or policy should be pursued to increase the demand.

Statistics are the barometer of trade, and without them, we sail on the sea of commerce as hopelessly and without purpose as a vessel without the charts or maps of harbors and channels.

Statistics of the Lime Industry

By Edith Munsell, National Lime Association

STATISTICS for the lime industry are not easy to compile. The difficulties involved are due in general to the fact that insufficient details on the industry are reported to the U. S. Geological Survey, and to the further fact that the Geological Survey is not in a position at present to compile such reports exhaustively. As an example of the difficulties, statistics on lime are not differentiated according to fineness

of the screen used. It is therefore impossible to know in what amounts, according to fineness, lime and limestone for agriculture are being applied on the land. For the same reason, values for one state will appear distorted in comparison with others, due to the fact that the price for limestone screenings may have brought the general average down to a ridiculously low figure. Again, it has been impossible until the present to make a comparison between the

use of lime and limestone in the separate industries since the production of limestone is not always obtainable on the common basis of tonnage, but in cubic feet, for example.

It is not possible at present to show consumption of lime by states in the separate industries, so that all the data here shown are necessarily presented on the basis of production.

The first graph (Fig. 1) shows comparison



Miss Edith Munsell

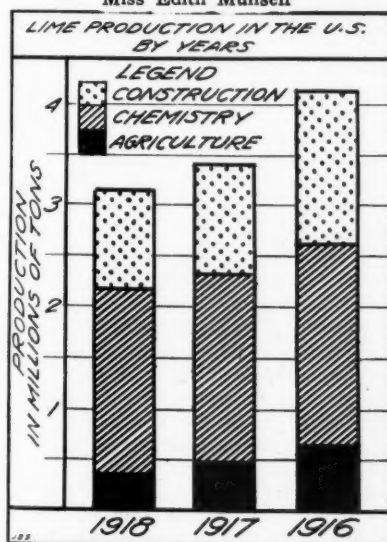


Fig. 1—Statistics of lime production

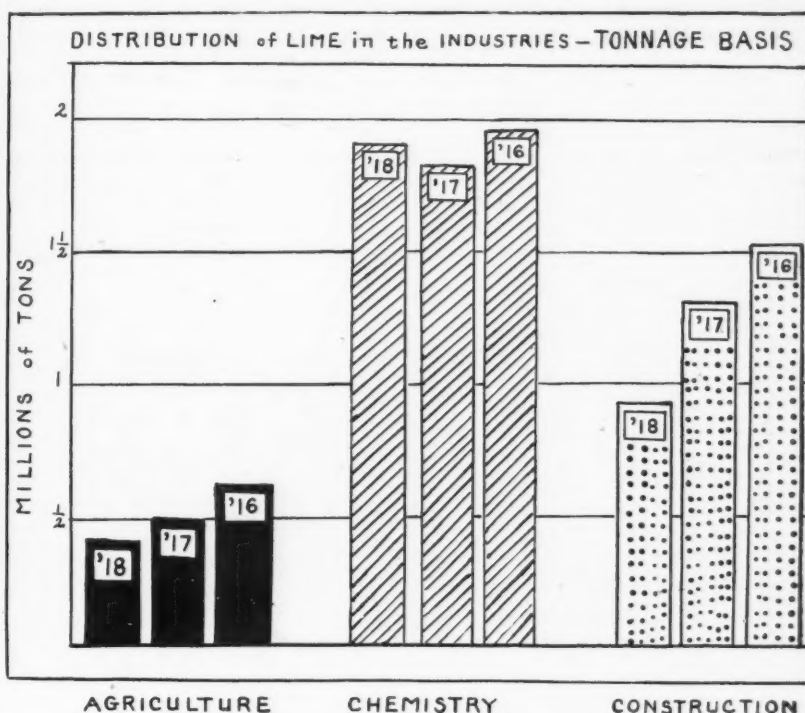


Fig. 2—Lime production by uses of the material

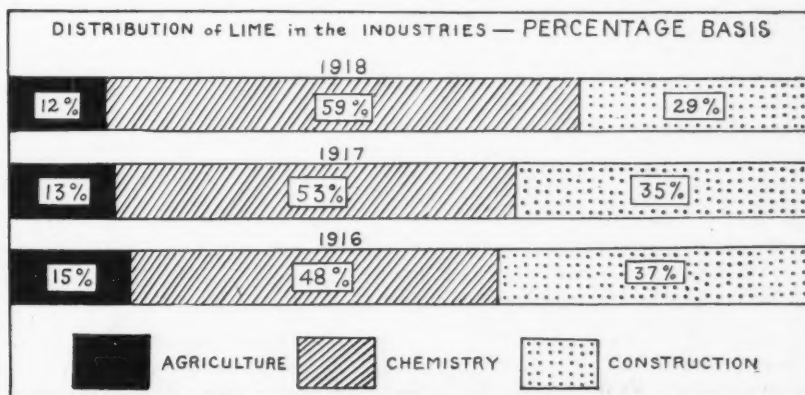


Fig. 3—Lime production in percentage by uses

tively the total production of burnt lime for the years 1916, 1917, and 1918, in the separate fields, agriculture, construction, and chemistry. The relative decrease in the industry is apparent. The decline, it should be noted, is largely confined to the construction field and to a more limited extent

to agriculture. Chemical uses of lime over this period very nearly held their own.

The next graph (Fig. 2) shows the proportions previously indicated, differently arranged and in greater detail. Agriculture and construction show a steady decline, while the tonnage of lime in chemical uses

remained almost constant over the three-year period.

The graph (Fig. 3) shows the distribution of burnt lime in the industries on a percentage basis, each bar indicating total or 100 per cent production for each year, with divisions denoting in percentage the lime produced for agriculture, chemistry, and construction purposes. On the percentage basis, it will be seen that agriculture declined gradually from 15 per cent of a total industry in 1916 to 12 per cent of the total industry in 1918. Construction dropped from 37 per cent in 1916 to 29 per cent in 1918, while chemistry benefited by the decline in the other two fields, increasing from 48 per cent of the total production in 1916 to 59 per cent in 1918.

INCREASE in HOMES BUILT in U.S. 1916 to 1920 inclusive

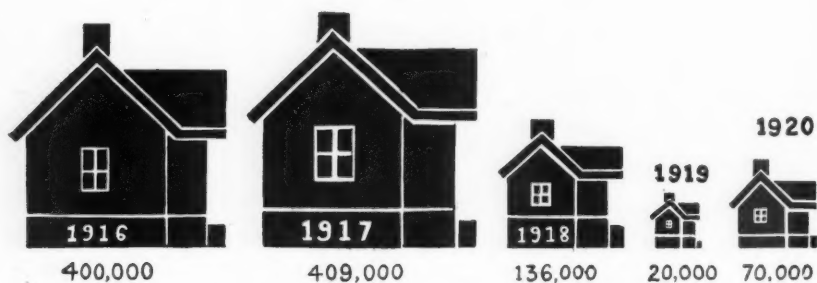


Fig. 4—Illustrating building field prospects

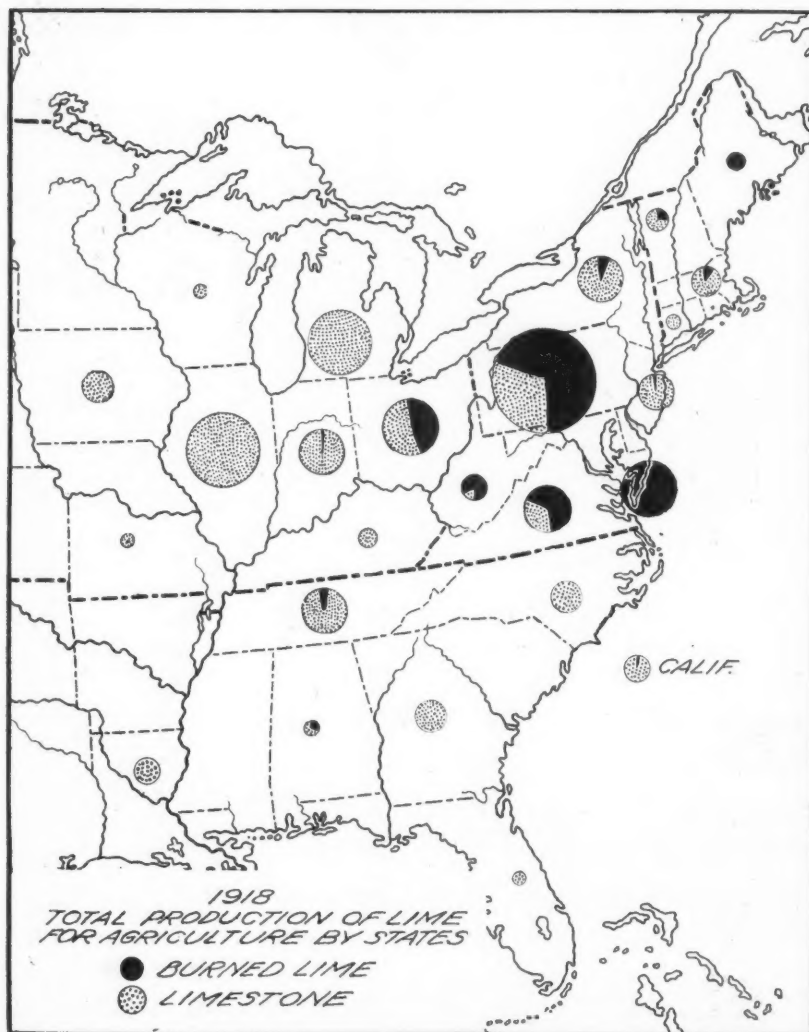


Fig. 6—Agricultural lime production by states

Show Favorable Future

The outlook for demand in the lime industry, based on statistics that are available, is very bright. In the chemical field the very fact that lime held its own over the wartime period is indicative of its

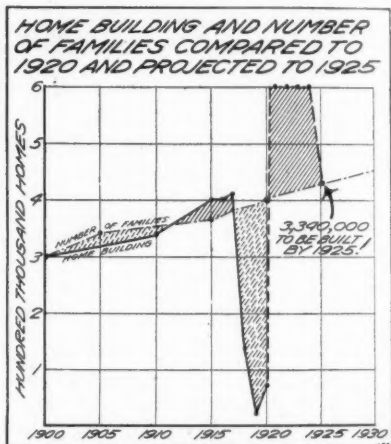


Fig. 5—Showing housing shortage

further increase. Added to this is the further fact that lime is essential in one or more processes of 115 out of the 165 chemical industries listed in the United States census. As these industries become more varied and more complex, the demand for lime in chemistry can naturally be fostered.

The use of lime in construction likewise shows promise. While the amount of lime used in construction fell perceptibly during 1917 and 1918, it is obvious that its use must increase proportionately with augmented construction. If the use of lime decreased in the construction field, its decline was inevitable owing to the decrease in construction itself. Illustrating from just one field of construction, i. e., that of home-building, the situation may be pictured somewhat as shown in Fig. 4.

The statistics on which this graph is based appeared in the April 13 number of "Building Supply News." On the increase in 1916 and 1917 at the rate of 400,000 and 409,000, respectively, each year, home-build-

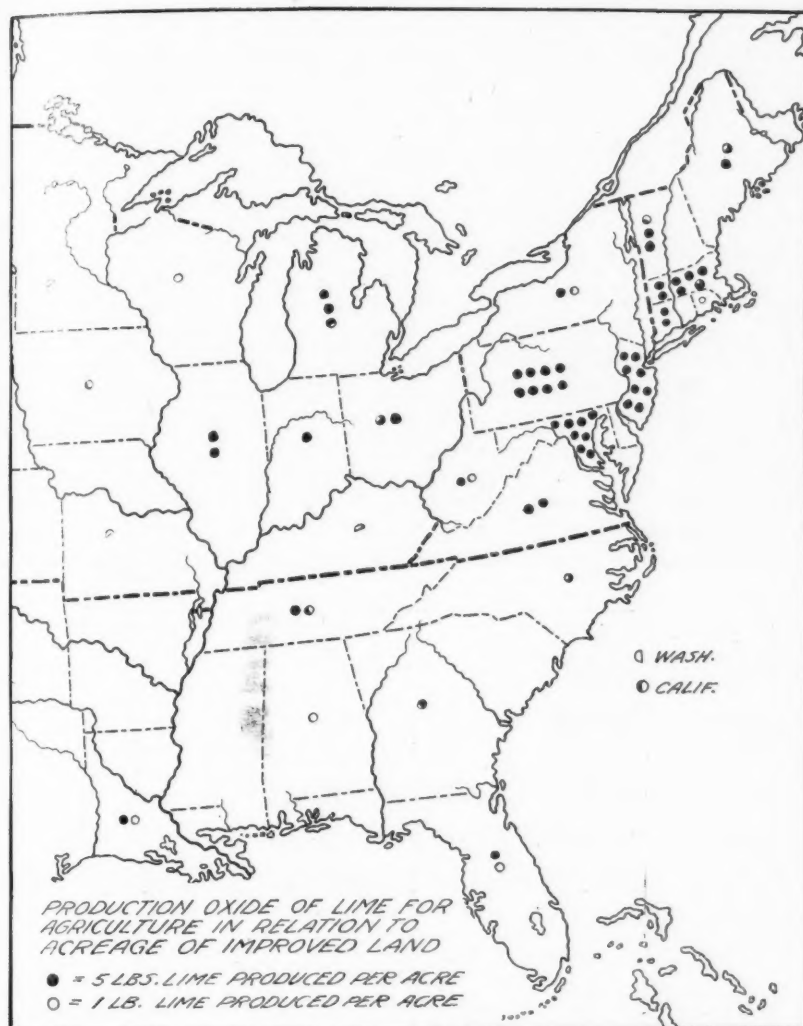


Fig. 7—Agricultural lime consumption by states

ing declined sharply to 136,000 new homes in 1918, but 20,000 in 1919. Thus far in 1920 the outlook shows pronounced improvement.

Home-Building Prospects Enormous

The next graph (Fig. 5) compares the trend of home building over the last twenty years with the increase in number of families over a corresponding period, and projects what the future of home building must be over the next five or ten years in order to make up the deficiencies of the years 1917 and 1918 and relieve congestion.

If the pre-war basis of 115 families to 100 homes is realized by 1925, 3,340,000 homes will have to be provided between now and then. This means about 675,000 homes a year, as against 400,000 in 1916, or an advance of more than one-third beyond the most flourishing history of the industry.

If home building is to increase 33½ per cent beyond normal during the next five or ten years, the demand for lime in this

field of construction must increase accordingly. If an increase at all comparable occurs in other types of construction work, the future for building lime can surely be made to overshadow its present use in chemistry, which we have seen to be so large.

Agricultural Field

The largest possibilities for expansion of the lime industry are apparent in the field of agriculture. Production of both burned lime and limestone are reported by states through the U. S. Geological Survey. The extent of this production is here broadly indicated for the year 1918. The dotted areas on Fig. 6 indicate production of limestone, the solid black burned lime. In both cases the circles have been plotted on the basis of oxides contained. It will be observed that for the industry as a whole, Illinois, Michigan and Pennsylvania are in the lead, while for burned lime Pennsylvania, Maryland, and Ohio are the largest producers.

The next graph (Fig. 7) shows the

amount of agricultural lime each state is producing per acre of improved land. Each black dot indicates a production of five pounds of lime or limestone per acre of improved land. Thus Pennsylvania produces 40 pounds per acre, as do New Jersey and Maryland, also New York produces about but six pounds to the acre, Ohio eight pounds, Wisconsin 0.6 pound. Averaged for the states shown, 11 pounds of lime per improved acre are being produced. It must be remembered, however, that some states which need lime for agricultural purposes, produce no lime or too small a quantity to be represented on the map for purposes of comparison. New Hampshire, Delaware, Alabama, South Carolina, and Texas may be cited as examples.

Taking into consideration the lime needs

IMPROVED LAND AREA of U.S.

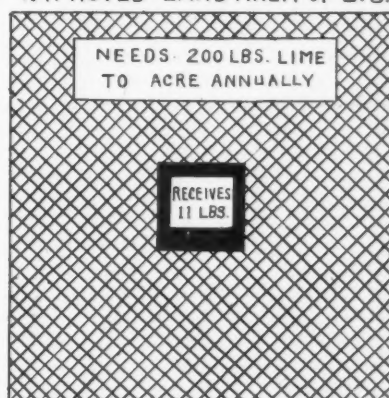


Fig. 8—Present consumption and necessary use of agricultural lime

of the states individually, we find that an annual application of about 200 pounds of oxides of lime to the acre is essential (Fig. 8). In view of the fact that the states producing lime average a production of but 11 pounds each, the amount that is needed on the land is, roughly speaking, twenty times as much as is being applied. In terms of the present industry, this means that the amount of agricultural lime and limestone needed on the land annually is twice as great as the total annual tonnage of burned lime produced today for chemical, construction, and agricultural uses combined.

New Agricultural Bulletins

THE NATIONAL LIME ASSOCIATION has recently issued trade bulletin No. 105, "Methods of Applying Lime," discussing the use of agricultural lime on the soil by incorporation and top-dressing; and trade bulletin No. 108, "Lime and the Vegetable Garden" shows the need of garden soils for lime, the dislike of most vegetables for an acid soil, the kind of lime to use, and the amounts to be applied.

Some Aspects of Lime in Soil Maintenance

The A-B-C of Lime in Agriculture and Why Any Farming in the Long Run Is Impossible Without Lime

By J. A. Slipper

Asst. Manager Agricultural Department,
National Lime Association

THE FARMER has come to know that the growth of crops and the production of live stock is a drain upon the plant food content of his soil. The stern truth of this fact has obliged him to resort to artificial additions of plant food in the form of commercial fertilizers in order to make up the losses. The use of the elements—nitrogen, phosphorus, and to a less degree potassium—have proved profitable over a large area of the soils of the United States.

What has been true of the depletion of these elements is equally true of lime, for lime is consumed by crops and animals in substantial amounts, and when these products are sold from the farm for human food, the soil has parted with some of its lime. Farming, then, drains the soil of its lime constituent. Year by year the loss goes on; it is now taking place; and it will continue to occur whether the system of farming is good or bad. Obviously, it is a loss that is inevitable and persistent. In order to maintain crop and animal production, then, the loss must be made up by artificial additions of some form of liming materials upon the soil.

The problem of liming the soil is not a temporary one. It is not with us today and gone tomorrow. The need is ever present. A single application of lime to a hungry soil will not permanently satisfy its needs. A systematic replacement of all soil losses is the only road to a healthy, vigorous soil and a permanent agriculture.

Coming more directly to the underlying facts, it is notable that all crops use appreciable quantities of lime as food. Different crops differ in the amount consumed. The graph (Fig. 1) shows the relative amounts consumed by average acre yields of crops. Legumes are especially heavy feeders, requiring about three times as much as the non-legumes. By the growth and removal of legume hay, a large total quantity of lime is removed from the soil in the course of several years. On soils poorly endowed by nature, the process of depletion soon reaches a critical point occasioning the need for artificial replacement.

The farm animal figures in the lime depletion of soils. Lime constitutes a large part of the bone. Moreover, lime is a constituent of milk. The sale of the animal or milk lessens the lime asset of the farm in a measurable degree. On this point, Director Thorne of the Ohio Station states that: "The milk from the average cow

bushels of corn; or, in other words, a lime exhaustion equivalent to 12 acres of wheat or corn."

Lime is Positively Linked Up With the Nitrogen and Organic Matter Problem

The farmer's cheapest source of nitrogen is the atmosphere. He can draw upon that free supply only by the agency of legumes.

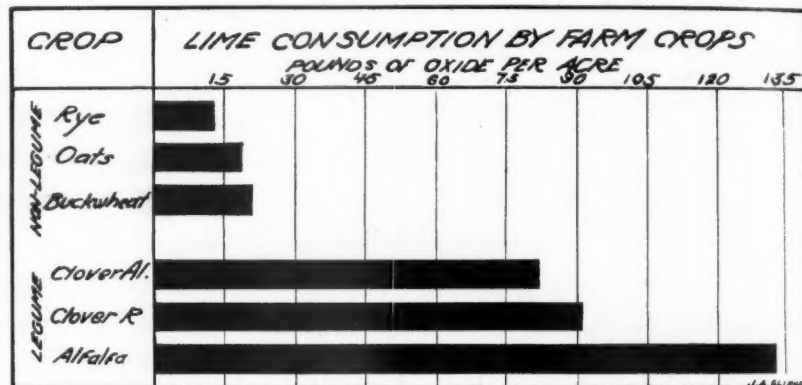


Fig. 1—Lime consumed by average yields of farm crops: rye, 20 bushels per acre; oats, 45; buckwheat, 20; alfalfa, 3 tons per acre; red clover 2, and alsike 2

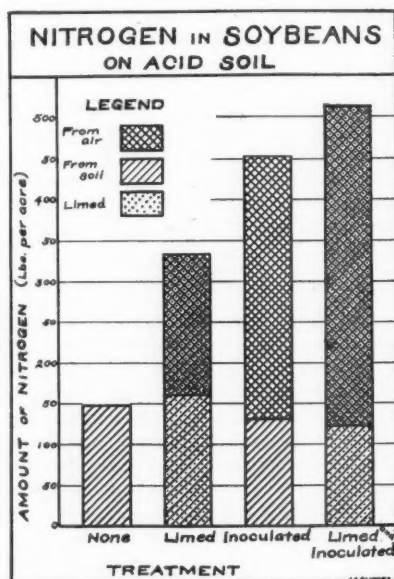


Fig. 2—The role of lime in capturing atmospheric nitrogen. Lime and inoculation reduced the amount of nitrogen taken from the soil and decidedly increased that gathered from the air

The legumes, in turn, are largely dependent upon lime for their successful growth, as certain concentrations of acidity of the soil is inhospitable to the development of most nitrogen-fixing bacteria which are directly responsible for the capture of the nitrogen. Lime enables these organisms to establish themselves in the soil; enables them to hold over from year to year; and it intensifies their activity. It should be said that there are few acres of farm land in the eastern half of the United States that can boast of having an adequate supply of nitrogen for most profitable cropping. The gross deficit is large and the relief lies in legumes and lime.

The large place that lime holds in the process of nitrogen acquisition is clearly shown by the graph (Fig. 2). Lime used alone was responsible for the addition of \$6 worth of nitrogen; while lime and inoculation together facilitated the capture of \$15 worth of this element. Lime is unquestionably the key to this cheap and vast storehouse of nitrogen.

Lime is a Potent Factor in Good Tilth

Wholly aside from the above benefits, lime has the power to improve soils in a

physical way. This is a benefit that is too often ignored. Soils well supplied with lime are generally in a good physical condition; while those deficient in that constituent are in poor "tilth." The exact relation of lime to the physical well being of soils is best revealed by an actual demonstration: (*Fine soil in suspension treated*

cating that granulation has taken place. Experimental evidence on this point of friability as affected by lime has been obtained at Cornell University.

The relative results are shown in graphic form (Fig. 3). Here again it is to be noted that oxide and hydrate are decidedly potent in reducing the resistance of the

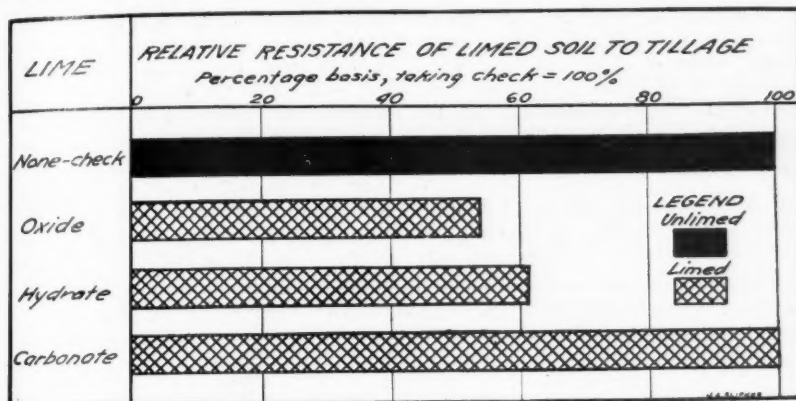


Fig. 3—Relative power of lime to render soils friable or weaken their resistance to tillage. This is a measure of good tilth. The slightly lesser effect of the hydrate was due to its being used in much smaller quantity than the oxide or carbonate

with lime.) The minute soil particles have drawn together (almost instantly), and arranged themselves in fluffy clusters visible to the eye. These groups, being analogous to a single soil particle of equal size (like sand), settle to the bottom, clearing the liquid. The grouping process occurs in the field when lime is added, but more time is required for maximum effect. The resultant condition is friable, loose and mellow—one which every good farmer seeks to obtain. He terms it "good tilth."

We are interested in knowing just how different forms of lime are effective in this capacity. The soils in the cylinders have been variously treated. The first one is without lime. The second one has the addition of calcium oxide, while the third is treated with hydrate, and the fourth with carbonate, all on the practical equivalent basis. It is very obvious as to the relative effects. Oxide and hydrate are identical. The limestone is apparently inactive or at least its action is not immediate. Possibly in time it might exert an appreciable amount of influence; especially would this be true in the presence of decaying organic matter which would release carbonic acid and thus affect the composition of the carbonate, changing it to a form that might be moderately active. This question, however, is one that has not been settled by experiment.

The effect of lime is well demonstrated also by treating soils in a plastic state, and drying the material. The briquets have been treated in the same way as the soil in the cylinders. The first one is without lime, is very hard, and cohesive; while the second one, containing the hydrate, has its breaking resistance greatly reduced, indi-

than that of the oxide. It should not be concluded, however, that limestone or carbonate has no benefit in this connection, for it does. It can improve the physical make-up of the soil by reason of favoring the growth of legumes which can be utilized to build up the organic content of the soil. This accumulated organic matter in turn has the power to improve the tilth in a manner analogous in effect to lime. This of course is an indirect and slower process.

This matter of creating and maintaining good tilth is vital. Fundamentally, good tilth is the hub of an efficient soil. This is true for several reasons: First, an agricultural soil must be permeable to roots permitting and inviting their penetration and wide distribution. When seed germinates it is of the greatest importance that the small roots be enabled to penetrate the soil with the minimum of resistance and that the stem may push its way through to the surface with ease. It is under this condition that the young plant can quickly establish itself and begin vigorous growth. Under a soil condition of great density, tendency to bake; and crust, there can be no hope but for a stunted plant, and con-

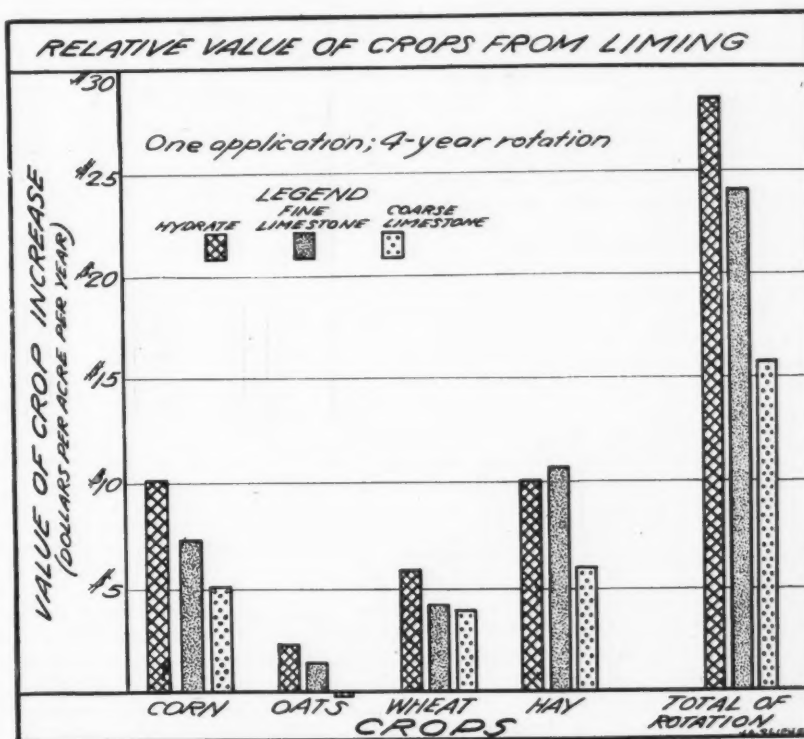


Fig. 4—Lime beneficial on many farm crops. Corn has profited as much as hay. The total monetary increase for the rotation or from one application is \$25. The presentation is based on the results of Ohio's comparative lime test

soil to manipulation, while the carbonate appears to have exerted no effect within the duration of the experiment. The slightly lesser effect of the hydrate was due to its application being much smaller in quantity

sequently an inferior yield. Lime fortifies a soil against such a situation.

The second reason why good tilth is vital is that it favors a ready reception of rainfall, an adequate distribution of this mois-

ture in the root zone, and finally it regulates in a large way the subsequent movement of water to the plant roots as well as encouraging a spreading root development. Moreover, where an excessive rainfall occurs, the percolation of the excess water is facilitated, relieving the crop of any danger from standing water. The prevention of the baking and crusting over of so-called "heavy" soils is a problem that is quite widespread and one that the farmer is deeply concerned over.

A third count for good tilth is that an open, friable soil guarantees an ample air supply which brings with it the oxygen needed for roots, bacteria, and various processes that go on in the soil. Likewise, nitrogen from the atmosphere is enabled to enter the soil freely and be utilized by the bacteria. It is not an uncommon sight to see the sad predicament of a crop that is suffering nitrogen-starvation as indicated by the greenish-yellow color of the plant. By loosening and opening up soil in this condition, the decay bacteria in the soil are provided with oxygen and are enabled to resume the production of nitrates which the plant is hungering for.

A fourth value of lime on tilth must not be overlooked. Tillage operations are made more effective and at the same time less costly because fewer operations will yield a better seed bed than would a larger number when the soil is untreated with lime.

English Experience

In England, where lime has been used very extensively, an English farmer has said that he could plow with two horses after liming, whereas before the task required three. At the present time with the cost of crop production running high, the wisdom of having a soil that lends itself readily to tillage is of prime concern and one that materially affects the net income of the farmer. The good granular condition established by liming is not easily destroyed by heavy rains and other natural forces.

The soils of the United States which are in need of physical benefit are quite extensive. They are scattered from Florida to Texas, to Maine, and to Wisconsin. Many soils of southeastern Texas respond well to the use of lime. The soils of southern Illinois, Indiana, and Ohio are notably lacking in good tilth. Many soils of New York, of Pennsylvania, Maryland, and other eastern states are lacking in good tilth. Among these might be mentioned the Volusia.

What Soils Need Lime for Improvement of Tilth

It should not be inferred that all soils are in need of physical improvement. It is only those soils that are fine, that are tenacious and lacking in organic matter that need attention. It is the so-called "heavy" soils that fall in this group. The silt loams, the clay loams, the silty clays, and the clays, are the types that are improved. The United States Soil Survey

shows that these particular types of soil make up 47 per cent of our farm area. While it is true that only part of these would be responsive, in the aggregate the need for lime for this purpose is enormous. It so happens that in a great majority of cases the soils which need physical improvement are also acid and need lime for that reason also.

Though lime fortifies heavy soils against many physical ills the effect while rather durable finally disappears and it becomes necessary to add more lime in order to maintain the superior well-being of the soil.

Crops Benefited by Liming

It is the general thought that only legumes are benefited by lining. It should be said that it is equally true that

grades of limestone. It is often said that the concentrated forms of lime like oxide or hydrate are very favorable for the first year or two but finally the effect dwindles out while limestone, though being slower to start, exerts its greater influence in later years. In other words, the idea is that limestone is more durable in its effect. In the graphs (Fig. 5), given, which are based on the work of the Rhode Island Agricultural Experiment Station, it is to be noted that hydrate starts off the first year with the largest increase and continues to maintain this lead for five years. Fine limestone ranks second. It maintains its initial lead over coarse limestone for the full period of time. The average of all five years shows the relative value of these different forms of lime on alfalfa. The soil to begin with was acid.

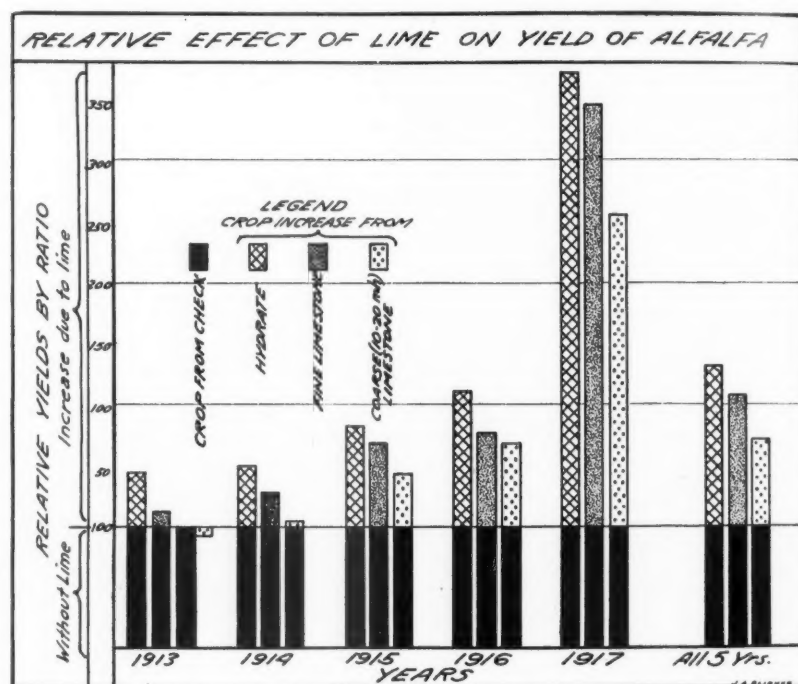


Fig. 5—Relative efficiency of different forms of lime as measured by the crop increase with alfalfa. The bars are on a percentage basis. It is evident that a pound of oxide carried by burnt lime has a greater crop producing power than a pound carried by carbonate, owing to the greater availability. The same principle is also borne out by Fig. 4

other crops are substantially improved also. This truth is well set forth in the graphs (Fig. 4), where the crop increases due to liming are placed on the money basis. Corn, it is seen, has given as large a monetary increase as has the hay crop. Wheat has profited substantially but oats appears least affected. The value of the crop increase for the whole rotation of these four crops, which were produced by a single application of lime is very notable.

Relative Value of Different Forms of Lime for Crop Production

We hear a great deal said about the relative value of caustic lime versus various

The lime in all cases was applied at the rate of 1200 pounds of calcium oxide equivalent per acre once in the five years.

The work of the Ohio Station on its comparative lime test reveals essentially the same principle for other crops like corn, oats, and wheat, and primarily the same ration in respect to the total for the entire rotations or for a single application of lime. The rate of application was 1½ tons of hydrate and 2 tons of limestone per acre.

Some statistics of the amount of agricultural lime needed in this country are given elsewhere.

The Use of Lime in Construction

What Was Lost Has Been Regained and What the Future Holds Depends upon Accurate Knowledge of Lime and Proper Specifications for Its Use

IN VIEW OF THE PRESENT BUSINESS conditions, it seems perfectly absurd for me to talk to you about the development of a market for lime as a structural material. I understand that you are all selling on the basis of "market price on day of delivery," that you are refusing to accept orders received on the 13th of the month, and that some of the more progressive of you are demanding that the orders be accompanied by bonds to insure prompt payment on delivery.

However, the life of a lime manufacturer is just one trouble after another. If it isn't labor, it is coal. If it isn't coal, it is cars. If it isn't one of these things, it is probably two, or even all three of them worrying you at once. In the days when cars were plenty, the question of a market used to be one of this triumvirate of troubles, and frequently the most bothersome one. Who knows but what such a condition may again arise?

It behooves you, as the wise business men you are, to foresee conditions which you will have to face, and to make preparations to meet them. In making these preparations, you must see to it that your cost of production is kept as low as it can possibly be made. You must also have an intimate knowledge of the properties of your product. You must understand thoroughly what lime is and how it is used. You must know what kind of lime can be made from your stone, and how you can change your process of manufacture so that the properties of your lime will best fulfill the expectations of your customer.

By this time you are getting bored, with the thought that this paper is just a lot of trite platitudes. The idea of telling you gentlemen that you ought to know what lime is! Well, take for instance the question of the fineness of hydrated lime. Several of you, as members of Committee C-7, A. S. T. M., have been arguing this problem for several years, and I think it is no breach of confidence to say that we do not yet know how fine hydrated lime ought to be.

Importance of Standard Specifications

As a weapon with which to meet the unorganized competition of new materials, there is nothing so powerful as a standard specification. An architect, engineer, or contractor, is much more apt to use a material which can be bought

By Warren E. Emley*

U. S. Bureau of Standards,
Washington, D. C.

on this basis, because he can rely absolutely upon the quality of the material being exactly as represented, and because it saves him the trouble and danger of attempting to prepare his own specifications. The A. S. T. M. has published three specifications for structural lime: one, standard, for quicklime; one, standard, for hydrated lime; and one, tentative, for mason's hydrate. The National Lime Association, through Mr. Hough and Mr. Armsby, has done a great deal toward the development of these specifications. The work is still very far from a satisfactory completion, and I want to urge all of you, as individuals, to get behind the committee and give it your active support.

This committee will write specifications for lime only, and not for its use. From the point of view of the builder it is necessary not only that the material he buys be of a satisfactory quality, but that it be used in accordance with the best practice. There should be standard specifications for the erection of a wall plaster. The Bureau of Standards has recently created a Conference to assist it in the preparation of such specifications, and I urge you to give this movement also your vigorous support.

The attempt to draw these plastering specifications has emphasized in my mind our colossal lack of definite information about lime. For example, will someone please write a standard method for slaking lump lime? And yet, without such directions, it will be practically impossible to include lump lime in our plastering specifications.

It is advisable, from every point of view, that there be two specifications for hydrated lime: one for masons' and one for finishing hydrate. This will enable the user to buy the quality of material he needs, and will permit the manufacturer to demonstrate his right to a higher price for a better grade of goods.

The chief points of difference between the two kinds of hydrate lie in their plasticity and color, yet we have no method, that has been adopted as standard, for the measurement of either of these properties.

*Paper read at the convention of the National Lime Association at New York, June 18.

Let me say right here that the lime industry as a whole is laboring under a serious handicap, due to the fact that nearly all of the finishing hydrate is made in Ohio. The car shortage has caused an uncertainty of supply of this material. Luckily, at least one manufacturer has learned how to produce a finishing hydrate in the East. While such a development will probably work a temporary hardship on the Ohio manufacturers, it will undoubtedly aid in the firmer establishment of the market for lime plaster.

Recent investigations have shown that the oversanding of lime plaster for brown coats is quite prevalent. Plasters as lean as 1:12 are not uncommon. Such a practice means that the manufacturer sells less lime, and that the user gets such a poor quality of plaster that he is disgusted. The Bureau of Standards Plastering Conference offers the means whereby the National Lime Association and the Plasters' Union can co-operate in the preparation and adoption of a specification whereby this practice of oversanding can be quickly and effectually stopped.

Lime and Gypsum Not Necessarily Competitors

Of course no remarks on lime plaster would be complete without some reference to gypsum. Let us remember that gypsum has a quick set, and that lime has not, and that lime has a degree of plasticity which gypsum has not. Why not, therefore, recognize that the properties of lime and gypsum are radically different, that they are best adapted to entirely different purposes, and are not competitors?

The gypsum manufacturers make a rather general practice of adding a little lime to their product at the factory, to improve its plasticity. Mr. Armsby's recent investigations indicate that the presence of this lime inhibits corrosion of metal lath. We all know that practically all white coat work is done with a mixture of lime and gypsum, prepared on the job. Why not co-operate with the gypsum manufacturers, and put on the market a ready mixed white coat? I have had three requests for such a material within the past month.

Before leaving the subject of plaster, let me call your attention to the fact that such properties as color, heat conductivity, and acoustics are of very great

importance to the architect and the owner. We have every reason to believe that these properties depend upon the character of the finished surface rather than upon the material of which the plaster is made. This opens a brand new field of investigation on how to improve the quality of plaster.

Lime in Mortar

Turning to the use of lime in mortar, we seem to feel an undercurrent of unfavorable public opinion. Is the lime of poorer quality, or has the mason lost his cunning? Why do we hear so frequently that the lime mortar of today is a weak sister of the lime mortar our fathers knew? No one doubts that a generation ago, lime mortar was an excellent piece of goods. Even today, old lime mortars command respect.

I contend that lime mortar is just as good today as it ever was. It would not be a very difficult matter to collect sufficient facts to prove this statement. It behooves your Association to collect these facts, to provide your salesmen with the necessary weapons to scotch this snake in the grass—this fairy tale of ancient time.

As a result of recent investigations and of the reinterpretation of older data, it would seem that the quality of the mortar does not have so much influence on the strength of brickwork as was formerly supposed. Does the use of a strong mortar necessarily imply the production of a stronger wall or pier? Very probably it does not. If this is true, then all of the arguments against lime mortar, based on its low strength, fall to the ground. This is a very interesting point, worthy of further investigation.

Should lime be used in the mortar for building a brick chimney? Mr. Hough developed the information that it is always so used. More emphatically, the large firms who make a business of chimney construction insist that the lime is absolutely necessary. Here is a permanent market for lime which has apparently grown up without any care or attention from the lime manufacturers, either as individuals or as an Association. I wonder how many similar markets could be developed to equal permanence if they were properly nurtured?

Hydrated Lime in Concrete

And now we come to that most baffling question, the use of hydrated lime in concrete. This is in about the same class as the use of sugar in tea: arguments on both sides of the question can be produced ad infinitum, but, in the last analysis, whether or not a man will use sugar in his tea, or lime in his concrete, is a matter of his own personal taste. Your salesmen are handicapped by lack of accurate knowledge.

Heretofore the great difficulty has been to find a fair basis for the comparison of concretes containing lime with those without lime. They have been compared on the bases of the actual water content, the apparent wetness, the flowability, etc. But there is always someone who bobs up at the last moment with the utterly unanswerable argument that he doesn't believe we have used a fair basis of comparison.

At present, investigative effort on this subject is being directed toward the determination of the effect of lime on the workability of concrete. This is somewhat difficult, because we don't know how to measure workability, as yet.

Need of Lime Technologists

Judging from the ante-diluvian history of lime, about which so much had been written, one would expect that most of

these problems had been solved a thousand years ago. The man of today should be able to class the properties of lime with the multiplication table as pieces of exact knowledge. How far this is from the truth, let yourselves be the judges.

In the above I have merely touched the high spots which must be solved to insure the continued use of lime as a structural material. There is another matter which is equally as important as the solution of these pressing problems of today. This is the development of a corps of lime technologists, who will have the specialized knowledge and ability to attack future problems as they arise, and thus insure the permanence of the industry.

Above all, let us realize that little can be accomplished except by united effort.

Lime Men Consider Freight Rates on Building Materials

Leaders of the Industry at New York Convention Believe Rates Too High for Value of Commodities

WITH THE WIDESPREAD INTEREST now being taken by every industry in the freight rates charged for moving its particular commodity, the glaring inequities and chaotic state of the whole railway rate structure is becoming pretty well known. In the case of building materials, at least, it would seem that the increases in rates since General Order No. 28 went into effect in 1918, and the present proposed increases, are only augmenting the discrepancies and injustices which have always existed, but which were never before made a matter of general interest. Under the conditions as they exist today, it is difficult to see how a general reorganization of the rate structure on an equitable basis can long be deferred.

This thought was injected into the convention of the National Lime Association at New York City, by Lowell M. Palmer, one of the most influential lime manufacturers of the East. Mr. Palmer, who is president of the Palmer Lime and Cement Co., New York City, has had his traffic expert study the freight rate structure as a whole, with the inevitable conclusion that wrong and improper classifications, co-operation on the part of some big shippers and various other devices have resulted in extremely low rates on valuable commodities and very high rates on building material.

Lime, for example, according to Mr. Palmer's figures, pays an average freight rate equal to 23 per cent of its value; also lime pays about twice as much per

car-mile revenue as the general average car-mile revenue of the Eastern district, including lime.

There was considerable discussion of Mr. Palmer's proposition that freight rates should take into account the value of the commodity moved. Some took the position that the present time was not the proper time to bring up such a matter, as first of all the railways must have more revenue.

Rates on Gypsum Rock

EXAMINER WALTER R. McFARLAND, in a tentative report on No. 11129, Cape Girardeau Portland Cement Co. vs. Chicago, Rock Island & Pacific, et al., recommends a finding that the rates on crushed stone from Southard, Okeene and other points in Oklahoma where gypsum rock, used in manufacturing cement, to Cape Girardeau, Mo., were and are unduly prejudicial to the extent that they exceeded or may exceed rates on like traffic to Hannibal and St. Louis, Mo. He said the rate of 16 cents, under attack, had not been shown to be unreasonable per se but merely prejudicial to Cape Girardeau by reason of the lower rates to St. Louis and Hannibal for substantially similar hauls under like conditions and in similar circumstances. The carriers testified that the rates to St. Louis and Hannibal were and are unduly low and that they expect to raise them. Commissioner McFarland said reparation should be denied.—"Traffic World."

What is the Immediate Outlook?

If Construction Is to Proceed and Take Advantage of the Unprecedented Demand for New Homes, New Highways, Railroad Improvements, and Public Works of All Kinds, Transportation Conditions Must Be Adjusted, Sound Price Levels Must Be Established, and Greater Incentives Must Be Given to Labor to Produce More Efficiently—A Call for United Effort and Counsel

THERE ARE A GREAT MANY FACTORS affecting the immediate outlook for construction—rents, commodity prices, crop conditions, finance, the coming Presidential election, all of which must be studied for their bearing on the outlook for any particular type of construction. Rents may have to go higher before a normal program of new construction of many kinds can be profitably undertaken at present costs; commodity prices must be stabilized before normal industrial expansion can be realized; adequate crop returns are the basic indicators of adequate finance which governs all industry; and, while we hope there will be no disturbing economic questions such as the tariff raised in the coming election, yet in these days of government control and legislative regulation, the selection of a President and a national program will have much to do with the plans of all industry, including construction.

These are factors which no one can accurately forecast and to which each contractor must give the weight which, in the light of local conditions, he feels they deserve. No analysis of the future of construction, even for the coming six months, however, can be made without taking them into consideration. There are, nevertheless, three major factors which profoundly affect the outlook for construction, and which can be met by united effort and counsel. In order that any program of construction may be developed for the coming six months, we must first devise ways and means to adjust transportation conditions, establish sound price levels for construction materials, and secure from labor its full efficiency. In direct proportion to the extent to which these questions are settled, will construction of all kinds proceed.

Curtail Transportation of Luxuries

Ultimately, the transportation problem is largely one of rates and control. With adequate rates assured at the earliest possible date, the equipment and facilities of the roads can be maintained in relation to the demands being made upon

By W. A. Rogers*

President, Associated General Contractors of America; President, Bates & Rogers Construction Co., Chicago

it; and wages commensurate with the service rendered can be paid. It will take time, however, to repair present equipment, build new rolling stock and increase facilities. Meanwhile, we shall have to adopt some plan of sharing present facilities with other industries in proportion to the need of our products. Since rates cannot be shifted like prices, according to supply and demand, some other means must be adopted in apportioning transportation facilities. This means the re-establishment of priorities sooner or later in some form or other. Already this has been started. From present indications, if construction is not to be practically suspended in some sections of the country, construction materials must be given the right of way over other less essential commodities, second only to food and fuel. With inadequate facilities at hand, only by curbing the distribution of luxuries which have jammed our freight houses and made use of cars which should have gone to more essential needs can the present situation be handled and construction proceed.

Give Costs and Profits Publicity

Sound price levels are fundamentally a matter of publicity; for, with confidence in the justice of present prices restored which would follow full publicity of costs and profits, fear that a slump may be just around the corner will be removed. Then normal buying will be restored by the knowledge that lower prices can only be had as a result of slowly deflating the world's currency and slowly increasing the world's production, processes which will require time to accomplish. Without such knowledge, investors will hesitate to build and banks will hesitate to finance new projects.

Give Labor Incentives to Produce

To increase the efficiency of labor is

mainly to create a new ideal in industry—the ideal of increased production. But such an ideal is of little value without an incentive behind it. During the war patriotism and the spirit of team-work for a common aim supplied that incentive. If workmen continue to demand increases in wages, shorter hours and decreased production, they may automatically create such an incentive in the competition among themselves for jobs, because of a slowing down in construction followed by idle workmen. Better, if means could be devised, to increase the efficiency of all construction labor at rates satisfactory to all.

The elimination of restrictions on output is fundamental. Moreover if some plan could be worked out by which there would be restored the mutual confidence between the contractor and the employee and by means of which it would be impressed on both that their interests were identical and that in the long run decreased production costs the workman as much as it does the employer, then a long step in the right direction will have been taken.

An Unprecedented Need for Construction

In spite of these things, however, and underlying them all, there is one outstanding feature in the present outlook for construction: This is the unprecedented need for new homes, new highways, railroad improvements, and public works of all kinds which were postponed on account of the war, and which are today only subordinate to the nation's need for food and fuel.

The proportion of these which will be undertaken during the coming six months will depend upon the extent to which we solve the three major problems outlined above. When they have been satisfactorily dealt with, nothing short of a calamity can stop construction for long.

Since the above was written construction work in Chicago has fallen off very materially and on July 1 about half the members of the building trades unions were reported to be idle.—Editor.

*Reprinted from the June "Bulletin of the Associated General Contractors of America."

Practical Chemistry for Lime and Cement Manufacturers

VII—Water—One of the Most Useful Chemicals of Industry and Some Facts About It Every Manufacturer Should Know

THIS MOST IMPORTANT CHEMICAL COMPOUND of hydrogen and oxygen is composed of one part hydrogen and eight parts oxygen by weight, and as we have said, it can be decomposed into these elements by the electric current. Its symbol is H_2O and its molecular weight 18. Water is very abundant, covering about three-quarters of the globe. It is most necessary to man, plants and animals. Blood is seven-eighths water and our bodies themselves are more than half water. Most foods are made up largely of water, cucumbers, for instance, contain 97 per cent water.

With its physical properties and its change from a liquid to a solid (ice) or a gas (steam) all are familiar. Certain chemical properties which it possesses may be explained, however.

Solubility of Solids in Water

One of the most important chemical properties of water is that of dissolving solids. We all know that we can dissolve salt, sugar and many other solids in water. We also know that the quantity which we can dissolve in cold water is limited, but that, if we heat the water, more can be dissolved. It is a general fact that hot water will dissolve more of a substance than will cold. There are some exceptions to this rule, but not many. When water has dissolved all of a substance at any temperature which it will, the solution is said to be saturated. If a hot saturated solution is cooled, the solid will be thrown out of solution usually in the form of crystals. There is a definite relation between solubility and temperature, and the amount of any given salt which will dissolve in water at a given temperature is fixed. Thus 100 grams of water at 20° C. will dissolve 32 grams of potassium nitrate; at 50° C., 85 grams, and at 100° C., 246 grams.

Most gases are soluble in water to some extent. Some gases, such as ammonia, are very soluble in water. Ordinary household or aqua ammonia is a solution of ammonia in water. Gases like oxygen and nitrogen and carbon dioxide are only slightly soluble in water. Pressure increases the solubility of gases in water. Soda-water is a solution of carbon dioxide in water brought about by pressure. When the pressure is relieved, as when the bottle is opened, the gas will no longer stay in solution in the water and this causes the

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effervescence or bubbling which is nothing but the gas escaping.

Cold water will dissolve more of a gas than will warm water, and heating will usually expel a gas from its solution in water. Water containing such gases as oxygen, air and carbon dioxide may be very easily freed from these gases by boiling for a few minutes.

Crystals

When salts crystallize from an aqueous solution they often retain some water. Thus if sodium carbonate, Na_2CO_3 , is allowed to crystallize, the crystals will be found to be composed of 10 molecules of water for every molecule of sodium carbonate, and hence to have the formula $Na_2CO_3 \cdot 10H_2O$. The water is written separate from the symbol for the salt. This water obtained by crystallization is usually called "water of crystallization." It can always be driven off by heating at a fairly low temperature. Crystals do not all have water; sodium chloride, for example, does not, nor do crystals obtained from fusions, etc. (Do not confuse hydration with water of crystallization.)

Distillation and Evaporation

Owing to its ability to dissolve solids, water is seldom pure. If we boil water containing dissolved salts, the steam will be found to be pure and free from impurities. If the steam is condensed, the water so obtained will be found to be pure. This is why "distilled water" is pure. If the solution is boiled long enough all the water will pass off as steam and the original dissolved salt will be left. This process of recovering salts from solutions is called "evaporation."

Water in Industry

Water plays an important part in our industrial life and there are few industries in which its use is not essential. The great industrial use of water is, of course, for steam generation, for power, evaporation, etc. Other industrial uses are for cooling, washing and for mixing with lime, cement and plaster in building construction.

For all purposes, the value of water

depends largely upon the nature and quantity of the substances dissolved or suspended in it. Rain water, coming as it does from the condensation of water vapor, of which the clouds are composed, is originally pure; but even during its passage through the air it picks up some impurities. It dissolves some of the gases in the atmosphere, of which carbon dioxide is one, and it also gathers some minute dust which is apt to be present particularly near the earth. However, when the rain water falls on the ground and percolates through the latter, it dissolves whatever soluble matter it comes in contact with, collects bacteria, etc.

If the water contains less than 5 grams per gallon of the salts of lime and magnesia it is said to be *soft*. If the quantity is greater than this it is called *hard*.

Drinking Water

So far as drinking water is concerned, the impurities most objectionable are biologic rather than chemical. No doubt soft water would always be preferable for drinking purposes, but, as a general rule, dissolved mineral matter is not objectionable unless present in quantity. If much of the sulphates and carbonates of magnesia are present, the water is apt to be laxative. The alkaline waters of the desert contain sodium carbonate, rendering them too caustic for drinking, and the sea water so much sodium chloride that this is unfit for drinking. Usually the mineral constituents of ordinary soft and medium hard water have no effect on its potability so far as these constituents themselves are concerned.

It has been found, however, that there is a relation between the presence of certain chemical elements and the pollution of water from human sources. Thus human beings excrete chlorine and nitrogen compounds; hence, if these are found to be high on analysis, unless some other source than human beings is proved, it is to be surmised that the water has been polluted by human beings or animals and is unfit for drinking. The presence of a small amount of chlorine or of nitrates in water of themselves would do no harm, but if these come from a human being dangerous bacteria are also likely to be present from the same source. For this reason, a complete sanitary examination of water always includes chemical determinations of chlorine and of various nitrogen compounds.

Mineral waters contain various compounds of individual value, such as lithium chloride (lithia water), hydrogen sulphide (sulphur water). Aluminum sulphate (alum water) and ferrous bicarbonate (chalybeate water).

Water for Mortar and Concrete

Water for the manufacture of hydrated lime need not be pure. If much discolored from mud, simple filtration through sand will purify it sufficiently to allow its use.

Water for concrete also need not be pure. It should not contain an extraordinarily large amount of organic matter, sulphates or sodium carbonate, however. Ground waters containing large amounts of magnesium sulphate or chloride, or calcium or sodium sulphate, will in time cause concrete to disintegrate if they are allowed to seep through the concrete, consequently concrete which is to be exposed to sea water, which contains magnesium salts, or to the action

of ground waters, containing large quantities of these salts, should be made very dense so that any action which these waters may have on the mass of concrete will be confined to the surface. Destruction of concrete structures by sea water, due to chemical action, have occurred, and if small pieces of concrete are placed in solutions of the above salts they will after long periods disintegrate.

(To be continued)

Peat as Fuel for Lime Kilns

Several Lime Plants in Europe Have Used Peat Fuel for Many Years

THE USE OF PEAT as a fuel for lime burning is not a novelty in Europe. We have received the following communication of E. Schmatolla, consulting engineer, 217 Broadway, New York City, on the subject:

"It will interest you to hear that peat is used for lime burning very extensively in Europe and that I myself have designed and built several kilns which use this fuel; for instance, one in Upper Bavaria. In this kiln a very fine lime has been burnt from marble. The gas producer for the peat used at this plant is partly built into the ground and directly connected with the kiln, the outside walls of which also consist of marble. The peat has been dumped from narrow-gauge cars immediately into the gas producer, the feeding hopper of which holds several cubic yards. The lime obtained was thoroughly burnt fine lump lime. The burning temperature of the lime rock was comparatively high, but there was no difficulty in burning the lime with the wet peat gas. However, the design of the peat gas producer was such that a uniform gas was piped into the kiln.

Several kilns where lignite is used as a fuel are in operation in Europe. I have noticed that in this country the younger formations of lignite are sometimes called peat. However, I think that peat is that fuel which is still growing in the swamps where the old parts and roots of the plants, which are covered by water, are forming new peat, showing the character of the plant, while deeper down at the bottom of the swamp or on the hard pan the peat may show the character of lignite, or it may be entirely amorphous. While the young peat when dried retains its loose character, the amorphous peat will become stone hard like Bohemian lignite and will burn and gasify as the latter.

During the war, when coal was scarce, I became very much interested in the peat deposits and started to compare the geological maps of the U. S. Geological Survey and of the State Surveys, in order to find out where limestone deposits and

peat deposits are coming near together. From the geological maps of the State of New Jersey, I learned that there are peat deposits near some of the limestone deposits.

It may also interest you to hear that I have made a burning test which different kinds of American marble which I had obtained from a factory which makes interior decoration from marble. I have burnt a few barrels of broken pieces which were considered as waste and have obtained a very fine lime. I am now installing the laboratory for analyzing limestone and lime. I am also installing a simple but complete hydrating device which can be built on large scale for little money."

Lady Is Manager of Agstone Department

THE OHIO MARBLE CO., Piqua, Ohio, of which A. Acton Hall is president, enjoys the distinction of hav-



Miss M. B. Miller

ing a lady secretary and agricultural limestone manager. Members of the National Agricultural Limestone Association are already acquainted with Miss M. B. Miller, because she has been a faithful attendant at its meetings. A. P. Sandles, secretary of the National Association, says, "she is our Agstone Queen."

Miss Miller went to the Ohio Marble Co. as a young girl of just about eighteen, with probably four or five months business training after leaving Commercial College. She started in as stenographer at a wage at which an ordinary green stenographer would start. Right from the first she showed great adaptability and as the times advanced she has absolutely advanced with the times. She has never hesitated to undertake any work that has been put before her. From ordinary stenographic work she took charge of the company's "Pearl Grit" department, even to the extent of making trips from Boston to Denver and from Duluth to Jacksonville and New Orleans in the interest of "Pearl Grit."

Within the last few years Miss Miller has added to her other duties the handling of "Tomco" agricultural ground limestone, which is meeting with tremendous success.

A. Acton Hall pays her the following tribute: "I am frank to state that on Miss Miller's suggestion we aim to make our office as attractive as a home and that our employees work absolutely on the honor system, no restrictions being placed on their time."

Timothy Grows in Marble Waste

LIMESTONE as a factor in the growing of timothy hay is evidenced by a four and one-half foot stalk of timothy on exhibition at the People's bank, Searcy, Ark. This grew voluntarily in the marble yard of Stewart and Sons, the ground being covered with limestone chips and dust from the cutting of stones.

The above is from a local newspaper. It does not state who is responsible for the publicity thus given to agricultural limestone, but congratulations are certainly due some one as a live wire.

Coal Operators Tie Up Cars and Raise Price of Coal

Tactics Have Tripled Prices of Coal to Cement, Lime and Mineral Aggregate Producers—Building Material Prices Due for Some Big Jumps if Present Practices Are Kept Up

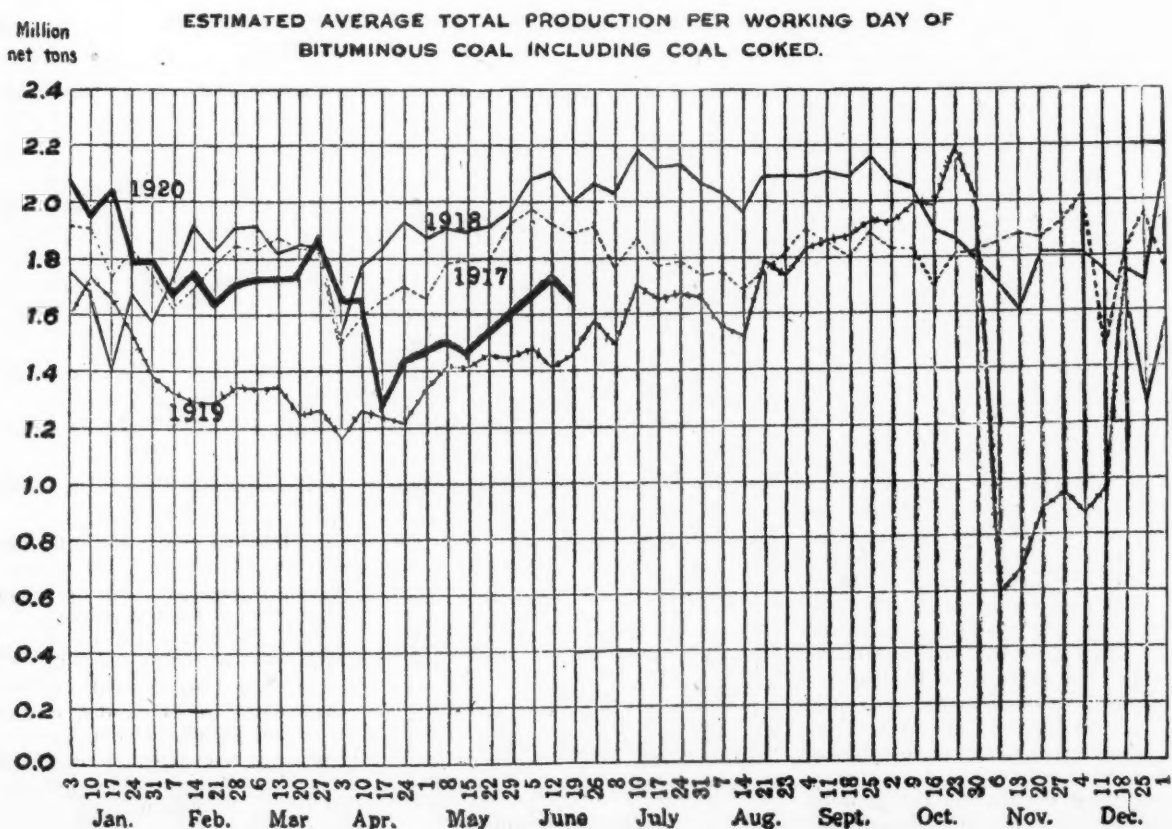
INTERVIEWS with many lime, cement and mineral aggregate producers during the last two weeks, and listening to discussions among these producers, inevitably leads to the conclusion that they are in a great many instances the victims of shameless extortion on the part of bituminous coal operators.

It is true that the present coal shortage is caused by a combination of reasons, among which are undoubtedly railway car shortage and general railway inefficiency. But these are not the only causes.

According to the figures of the United States Geological Survey, coal production thus far in 1920 is 40,000,000 tons ahead of last year and but 16,500,000 tons below the enormous production of 1917. The present production is said by those who ought to know to be ample to take care of all domestic demands at this time of year. But these demands are not being taken care of. Why?

One reason is that coal is being exported at the rate of about 2,000,000 tons a month. Another reason is that foreign buyers are paying as high as \$20 per ton at the mines. Another reason is that the coal operators will not ship on standing contracts at prices of \$3.50 to \$5.50 per ton—but they will ship on the prices set by foreign buyers. That is, a week ago a lime manufacturer with all his year's supply of coal contracted for at \$4.50 per ton could not get a single car at that price, but if he were willing to pay \$8 to \$12 per ton he could have gotten as much as he needed. And prices are jumped every week to even up with foreign bids.

A tabulation of the cost of producing bituminous coal, just issued by the Federal Trade Commission, gives the average cost for the entire United States (1,081 operators) during the month of March as \$2.33 per ton, f. o. b. mines. We all know that costs since



Editorial Comments on the Issues of the Day

then have not appreciably increased. Why the \$12 per ton coal? Because there are just enough foreign bidders in the market to create a small temporary shortages, and because of this shortage domestic consumers are steadily and increasingly bidding against each other.

The car shortage is both cause and effect. The drastic measures taken to give the coal mines cars has taken thousands of cars out of their normal channels and glutted them in abnormal channels where it is beyond the power of the railways to take care of them efficiently. There are miles of proof of this statement surrounding all the Great Lakes and Atlantic ports.

Because of this glut of cars and the inevitable inefficiency in handling them, there is an acute car shortage in every building material industry, which threatens the very life of these industries.

This is the condition existing and the country is facing a fuel famine next winter nevertheless. With the mines actually being glutted with cars other industries need, the production of coal fell off over 3 per cent during the week ending June 19, according to the U. S. Geological Survey. Why did it fall off when the Interstate Commerce Commission is moving heaven and earth to supply cars and every industry is in crying need of coal? Because the great majority of consumers refuse to be held up for \$12 a ton.

The cost of cement and lime is made up about 25 per cent with the *cost of the fuel*. What will happen to the retail price of these commodities if the price of fuel is tripled and quadrupled? What will happen to the much needed building program if prices are jumped to keep pace with coal?

The development of the National Lime Association into the organization long dreamed of by the able and persevering leaders of the industry seems almost spontaneous. But it should not be forgotten by the lime men of this country that in reality the development of the lime industry to its present prestige is in no small degree due to the long, hard, faithful work of William E. Carson, for 15 years president of the Association, and its helmsman through perilous waters.

The photographic gallery of the men of the lime industry, which ROCK PRODUCTS presents in this issue, is the result of individual sittings in a hotel room adjoining the convention hall. This is the first time in the history of conventions that a photographer has rigged up a studio in a hotel room on short notice and taken portraits at intervals between sessions of a convention.

ROCK PRODUCTS regrets that this portrait gallery is

not 100 per cent complete, as was the earnest desire. Unfortunately the time was very limited and some members strayed from the fold at the most opportune times. Nevertheless we are complimenting ourselves on having been able to get so many; and we take this occasion to thank the men of the lime industry for their co-operation and the good nature with which they submitted to the ordeal.

The now famous hearing of the mineral aggregate industries before the Interstate Commerce Commission has become history. Whether the Interstate Commerce Commission grasped the real facts or not remains to be seen. However, the matter is not settled definitely one way or the other. The railways must still go before the state railroad commission.

While it is a foregone conclusion that the various state commissions will allow whatever the Interstate Commerce Commission considers essential, it does not by any means follow that the minds and hearts of the state commissioners are closed to appeals for fair play. As nearly all mineral aggregate traffic is intrastate traffic the sun has not yet set on the hopes of mineral aggregate producers for simple justice.

Hence it follows that both the freight rate situation and the fight for a fair share of open-top car service continue to be a source of anxiety and expense to the National Associations. The anxiety is being pretty widely shared, but the expense can stand having a few more partners.

A lot of propaganda is being issued on the subject of coal storage. In view of the present situation, there is no doubt that those who were forehanded enough to store coal during the early spring months are congratulating themselves. But who wants to store coal at \$12 to \$16 per ton?

To keep the coal industry operating on a normal and efficient basis there is no question but that the big users of coal like the cement and lime industries will have to take coal whenever they can get it, for a long time to come, or until such a time comes, if it ever does come again, when production of coal at seasons exceeds consumption.

But it seems sure that the present condition will not be relieved and big consumers induced to stock up until the coal operators can be induced or compelled to live up to their contracts. Lime, cement and mineral aggregate producers have contracts that *they* are endeavoring to live up to, and *they can't do it* if they have to pay three or four times as much for their fuel as their agreements with coal companies call for.

Coal Storage

Lime Progress

Convention Photographs

American Cement Plaster Co. Consolidated with Beaver Board

One of the Largest Gypsum Producers Becomes Affiliated with Pulp Wall-Board Manufacturer

ANNOUNCEMENT has been made of the consolidation of the American Cement Plaster Co. of Lawrence, Kan., and of Chicago, Ill., one of the largest producers of gypsum and gypsum products in the world, with the Beaver Board Companies of Buffalo, N. Y., manufacturers of the well-known "Beaver board" and financially one of the strongest institutions in the building material line.

The American Cement Plaster Co. has very valuable and large gypsum deposits and mills strategically located at all principal gypsum producing points east of the Rocky Mountains, which provide gypsum for the manufacturing and serving of gypsum products to all markets on the most advantageous freight rates.

The merger brings to the American Cement Plaster Co. strong financial support for the carrying out of its ambitious and definite plans to increase its present plant capacity by additions to the present mills and the building of new mills, which will enhance the good-will this company already enjoys with the trade and will also give to the Beaver Board Companies the raw materials to further their plans of expansion along similar lines with the American Company, thereby bringing results not only to the companies interested but to the trade they will serve.

It is stated that J. A. Henley, president of the company, plans to retire within a few months and that W. E. Shearer has been elected vice-president and general manager and will be the managing executive of the American Cement Plaster Co. He is well known in the gypsum industry and has for many years been general sales manager for the American Cement Plaster Co. Warren Henley succeeds him as general sales manager.

The purpose and policy of the company is described in the following extract from a letter sent to the trade over Mr. Shearer's signature:

"You are undoubtedly interested in this announcement—that we have consolidated our company with The Beaver Board Companies of Buffalo, New York.

"It occurs to us that it is unnecessary at this time to refer to the character of service and the quality of materials that we have given our trade, but rather that you are interested in the object to be attained in the consolidation of the two companies.

"The Beaver Board Companies is a corporation of unusual, splendid reputation in its clean, progressive policies, as well as established financial strength.

"The result we hope and intend to obtain in the consolidation is to at once put into effect a policy of improving our properties, building new where necessary, for the manufacture of our various commodities to meet the requirements of the trade now and anticipated growth.

"Our purpose shall be to expand the pro-

duction of our plants, but at no time shall we overlook the valuable feature of quality.

"We sincerely appreciate your loyalty to us in the past and want to assure you that every effort of our combined companies in the future shall be exerted to the accomplishment of matters pertaining to our relationship that will work to our mutual benefits."

The American Cement Plaster Co. has established itself as an important factor in the gypsum industry and with a definite policy for expansion and sound, financial support, together with the well-known, clean, progressive policy of The Beaver Companies, it will undoubtedly soon reach a position of real dominance.

Sand, Gravel, Coal, Clay and Limestone in One Deposit

Pennsylvania Operator Claims Blue Ribbon for All-Round Rock Products Mine

W. N. R. COPLEY, of Brown & Copley, Manorville, Penn., writes as follows:

We are located on the B. & A. V. Division of P. R. R., 44 miles north of Pittsburgh, in the fast developing coal district of Armstrong County. We have some ninety acres of a glacial deposit (sand and gravel) averaging approximately 50 ft. of sand and gravel and are beginning on the second year of developing same. This deposit where we have begun taking out the material consists of a few inches of stripping on the surface, underlaid next with some twenty feet of coarse and pea gravel and sand, which runs about 33 1/3% of each to the cubic yard.

Underlying this seam we have eight to twelve feet of high grade sand of much finer quality than the upper sand that is mixed with gravel, and suitable for plaster mixing or rail sanding. Under the sand seam we have a seam of 17 to 20 feet of fine gravel consisting of a high percentage of pea gravel. Under this we have from 28 to 32 feet of high grade sand stone, known as the Mahoning sandstone, which is underlaid with the Upper Freeport coal.

Under the coal we have an eight-foot vein of blue clay and then next a harder (semi-flint) clay of some ten to fifteen feet thickness and immediately under this hard clay we have a twenty-foot seam of hard limestone. Some minerals! Some 140 ft. below the limestone we have the Lower Kittanning coal of the usual uniform thickness and quality. This seam, however, is undeveloped and only core drilled however.

The minerals are all high above the

level of the Allegheny River and so situated that same are being worked without any cost of elevation of materials, gravity being the power used to prepare same and carry it to bins.

With one bucket-elevator wagon loader, a 54-in. mule, 400 ft. of 30-gauge track, a 36-in. round hole through the sand rock to the Freeport coal into the mine entry, a chute 80 ft. long down hillside to bins, with water pit of concrete, with elevator and electric motor and five men, we have put over 200 cu. yd. of sand and gravel in the bins in less than nine hours.

Our water supply is from never failing springs of pure water which are coupled up so that they feed into two old clay mines which we have concreted across the entrance to converting same into reservoirs of many thousand barrels capacity.

P. S.—You've heard of the mineral wealth of the Monongahela River Valley, no doubt. The Allegheny River Valley is *seven times* more valuable in its mineral wealth. For proof of this statement we would refer you to our Congressman Hon. N. L. Strong, of Kittanning, Pa.

Another Household Use for Lime

THE CHEMICAL DEPARTMENT

of the National Lime Association finds that iodine stains may be easily removed from cotton, muslin or other white fabric by rinsing in clear lime water which has been heated to the boiling point. A few minutes' immersion is usually sufficient to completely remove the iodine whether the stain is new or old. The cloth should then be carefully rinsed in clear water before drying.

Federal Investigation of New York Building Supplies

**Producers Welcome Inquiry as to Present Shortage and High Prices
—Trying to Live Up to Old Contracts**

FEDERAL INVESTIGATORS have begun an inquiry in New York and vicinity to discover why new buildings projects cannot proceed to construction, why the cost of building materials is constantly increasing and why building materials are not being shipped into this market in the quantity called for, according to the Dow Service Daily Building Reports.

One of the outstanding causes of the inquiry was ascribed to the readiness of a very large financial interest in the Borough of Queens to start at once a several million dollar housing project to help, in a measure, solve the housing shortage in this city. It was promised certain materials if the prospective purchaser could obtain necessary cars in which to ship it. By dint of considerable energy and persuasion through powerful sources at Washington and elsewhere, the necessary cars were obtained, but the material was not forthcoming, according to the evidence before the inquiry. In another instance, certain other materials were desired to be delivered on a proposed new housing project in Brooklyn and, when influence was brought to bear to provide the facilities for the movement of the necessary materials, delivery was still deferred.

These are incidents fairly indicative of factors throughout the entire building material market that is barring new building not only in New York and vicinity, but in many parts of the country, particularly in the matter of housing construction. The fact now is that if present conditions are permitted to drift along as in the recent past, it will be, not one year or two, but possibly many years before the housing problem can even be approximately solved. Operating at 40 per cent of capacity, as the aggregate building material market of the country is being operated today, the present potential construction program, without a single additional new project, is sufficient to absorb all the material that can be produced under present labor supply and conditions for at least two years.

Federal Inquiry Starts

It is for the purpose of trying to correct this tendency that certain influential interests of this city have sponsored the federal inquiry that got under way in this city on Friday evening. If the program as then contemplated is carried through, the probe will reach deep into

the building material distribution and manufacturing industry.

Building material dealers and manufacturers supplying the New York markets welcome the projected investigation because the light of suspicion that has recently been directed against them by prospective builders who have found the cost of materials advancing out of hand since 1914 has not been pleasant and they have sought for an opportunity, they say, to show their side of the problem to the public, if, by so doing, it will give them an opportunity to connect their source of supply with the coal mines on the one hand and with the consuming centers of the country on the other.

Have to Fill Old Contracts

Practically every building material manufacturer has back orders running from six to eighteen months that he is obliged, under penalty of suit by those holding contracts for his commodities, to ship and deliver at market prices prevailing last year and, in some cases, in the year before that, before he can even consider making shipment on new business whether it is for housing or not. He would like to be able to take new business offered at present market prices, but he cannot do so as long as these unprofitable back-log orders remain on his books unfilled.

He cannot fill these back orders until he gets cars with which to ship the material he has in his bins. It cars are provided by the new purchaser, the old contracts have to be filled first.

Organizations Gone

Six months ago the reason this material was not shipped promptly was given as lack of man power at the plants to permit the mill to operate fast enough to fill these back-log orders. At that time the mill supplies were practically bare. Today the mills, kilns and quarries are choked tight with building materials that cannot be moved because of cars, and either because cars are unavailable for sending out the finished product or for bringing in coal, short time has resulted at the mills where the crippled organizations of six months ago have drifted to the cities to seek other employment. When, therefore, the starting-up time comes, if, indeed, it can now come before the middle of July or first of August, it will be a serious question in the minds

of the manufacturer whether it will pay him to replete his manufacturing organization for the short interim prior to the close of the 1920 building or manufacturing season.

The greatest and most important factors for the earliest possible relief of the housing shortage in this part of the country are an immediate complete release of cars for the transportation of building materials and right of way for building materials through the existing railroad embargoes on lines terminating in and near New York, guarantee of coal supply for all factories, mills and kilns manufacturing materials for housing construction (exclusively if necessary).

Department of Justice After Coal Profiteers?

THE U. S. DEPARTMENT OF JUSTICE, Washington, D. C., is threatening bituminous coal profiteers by its usual method of publicity. According to a Washington dispatch to the Chicago "Tribune," June 23, the Department of Justice is willing to help domestic consumers get necessary coal. The dispatch reads:

"That neither decreased production, car shortage, nor export demand justify present high prices of bituminous coal, was asserted today in a statement issued by the Department of Justice. The statement defines the attitude of the Department in connection with its recent order to Federal district attorneys for the prosecution of coal producers who are shown to be making exorbitant profits.

"It is declared the attributing of high prices to decreased production, car shortage, or export demands is no defense to the charge of profiteering under the Lever act.

Production Increases

"Commenting on the question of decreased production, the Department quotes from the report of the Geological Survey to the effect that while the production of bituminous coal for the first four months of 1920 was less than in 1917 or 1918, it exceeded both 1919 and the pre-war years.

"On the question of car shortage the Department says the service orders issued last Saturday by the Interstate Commerce Commission, giving priority to coal movement, should relieve this situation.

"Consumers of soft coal are asked to help to reduce price to a reasonable level by refusing to bid against each other for coal at high prices."

The above statement apparently does not take into account that if domestic consumers fail to bid, the mines will not have orders, and production will fall off, just as it has done, when coal is needed most. Evidently public officials should "guess again."

Rules Regarding the Advance Payment of Freight by Shippers

IN CONNECTION with the payment of freight charges and extension of credit the Interstate Commerce Commission has prescribed the following rules to become effective July 1, 1920, and remain in force until further orders by the Commission:

1. Where retention of possession of any freight by the carrier until the tariff rates and charges therein have been paid will retard prompt delivery or will retard prompt release of equipment or station facilities, the carrier, upon taking precautions deemed by it to be sufficient to insure payment of the tariff charges within the period of credit herein specified, may relinquish possession of the freight in advance of payment of the tariff charges thereon and may extend credit in the amount of such charges to those who undertake to pay such charges, such persons being herein called shippers, for a period of ninety-six hours, to be computed as follows:

(A) Where the freight bill is presented to the shipper prior to, or at the time of delivery of the freight, the ninety-six hours of credit shall run from the first 4:00 P. M., following the delivery of the freight.

(B) When the freight bill is presented to the shipper subsequent to the time the freight is delivered, the ninety-six hours of credit shall run from the first 4 p. m., following the presentation of the freight bill.

2. Every such carrier shall present freight bills to shippers not later than the first 4:00 p. m. following delivery of freight, except that when information sufficient to enable the carrier to compute the tariff charges is not then available to the carrier at the delivery point, the freight bills shall be presented not later than the first 4:00 p. m., following the day upon which sufficient information becomes available to the delivery agent of the carrier.

3. Shippers may elect to have their freight bills presented by means of the United States mails, and when the mail service is so used the time of mailing by the carrier shall be deemed to be the time of presentation of the bills. In case of dispute as to the time of mailing the postmark shall be accepted as showing such time.

4. Sundays and legal holidays, other than Saturday half holidays, may be excluded from the computation of the period of credit.

5. The mailing by the shipper of valid checks, drafts or money orders which are satisfactory to the carrier in payment of the tariff charges, within the period of credit prescribed above, may be

deemed to be payment of the tariff charges within the ninety-six hours of credit. In case of dispute as to the time of mailing, the postmark shall be accepted as showing such time.

New Head of Construction Department of the Lime Association

L. H. HART, a graduate in civil engineering of Ohio State University, class of 1904, and an experienced construction engineer, has been selected from a list of 20 applicants as head of the construction department of the National Lime Association.

Mr. Hart comes to the Lime Association from the Lakewood Engineering Co. of Cleveland, manufacturers of contractors' machinery. His chief experience has been as an engineer for building and general construction contractors, where he has had an opportunity to acquire a thorough knowledge of the constructional uses of lime.



L. H. Hart

Mr. Hart succeeds Norman G. Hough, who resigned some months ago to accept the position of district sales manager of the American Cement Plaster Co., Chicago, Ill. T. B. Shertzer, engineer of the Eastern Bureau of the National Lime Association, with headquarters at New York City, who recently made an extensive investigation of the construction outlook for the National Association, will return to his intensive development of the Eastern territory, where he can ill be spared for national work.

Current Retail Prices in New York City

ACCORDING to the Dow Service Daily Building Reports the prices of rock product building materials in New York City, June 26, were as follows:

CEMENT Delivered Manhattan, Bronx, Brooklyn and Queens	
Domestic Portland	\$ 4.80
Rebate bags returned in good condition, 4 bags to bbl. 25c bag.	
LIME Delivered job site in the Borough of Manhattan, Bronx, Brooklyn and Queens	
Finishing lime (Standard 280 lb. bbl.) per bbl.....	\$ 5.00
Common lime (Standard 280 lb. bbl.) per bbl.....	4.80
Hydrate finishing lime (in cloth bags) per ton.....	32.00
Rebate for bags 20c each.	
Hydrate finishing lime (in paper bags) per ton.....	28.00
Common hydrate lime (in cloth bags) per ton.....	26.00
Rebate for bags 20c each.	
Common hydrate lime in cloth bags) per ton.....	22.00
MORTAR Per ton delivered New York, Bronx, Brooklyn and Queens boroughs.	
Lath mortar	\$19.00
Brick mortar	19.00
Neat mortar	27.00
PLASTER Delivered job site in Manhattan, Bronx, Brooklyn and Queens.	
Per Ton	
Neat wall cement (cloth bags).....	\$25.50
Lath mortar (cloth bags).....	18.50
Brown mortar (cloth bags).....	18.50
Finishing plaster (cloth bags).....	28.00
Rebate for bags on all of the above materials, 15c each.	
Finishing plaster (250-lb. bbl.) per bbl.	4.75
Finishing plaster (320-lb. bbl.) per bbl.	6.00
Plaster blocks, per sq. ft. delivered Manhattan, Bronx, Brooklyn and Queens.	
2-in. Furring 12x30.....	.12
2-in. Solid .....	.15½
3-in. Hollow .....	.15
3-in. Solid .....	.19
4-in. Hollow .....	.17
5-in. Hollow .....	.25
6-in. Hollow .....	.30
8-in. Hollow—Manufacture stopped.	
PLASTER BOARDS Delivered job site Manhattan, Bronx, Brooklyn and Queens.	
27x48x½-in. each .....	.45
32x36x¼-in. each .....	.35
32x36x⅜-in. each .....	.36
32x36x½-in. each .....	.43
SAND Per cu. yd. to June 30, 1920. Delivered job site in Manhattan, Bronx and Long Island City, \$2.50.	
Prices for deliveries in Brooklyn, approximately the same as Manhattan, excepting work located a great distance from water front, in which case prices will be slightly higher.	

Ask Priority for Construction

Associated General Contractors Petitions for Order Stating on What Basis They May Share Transportation Facilities

AS A RESULT of scores of replies received to a questionnaire entitled, "Adequate Transportation for Construction," the following letter was addressed to the Secretary of the Interstate Commerce Commission on June 19. Accompanying the questionnaire was a statement giving in detail the lack of transportation facilities as reported by individual members.

The Associated General Contractors of America, representing the leading general contractors of the country engaged in all forms of construction work, respectfully submit for your consideration the following data received from their members in connection with the present inadequacy of transportation facilities.

We believe it is unnecessary at this time to call to your attention the serious need for construction of all kinds; additional housing to relieve the serious shortage of homes which confronts the country; greater industrial facilities to make possible increased production which will prove the most effective means of reducing the high cost of living; and the completion of essential highway work, so badly needed for the marketing of food products and the supplementing of inadequate railroad facilities. It is unnecessary to call your attention to the fact that the men, the materials, and the organization to conduct this work are at hand, but that lack of transportation facilities is seriously curtailing essential construction work of all kinds in every part of the country resulting in increases in material prices because of scarcity of material, increases in labor turnover because of lack of continuity of adequate supplies, and even, in many instances, increasing daily, the actual creation of idle labor where contracts have had to be suspended for lack of materials to work with.

On the other hand, we believe it is unnecessary to convince us that adequate fuel supplies must be assured the railroads and the industries of the country in order to maintain business, or that food supplies now stored in the warehouses of the country should be moved to the central markets for distribution to the people. We are convinced that fuel for essential industries and food for all should be given preference over the transportation of every other commodity in the country.

Since there is a serious shortage in transportation facilities, we are also aware that some method must be devised of sharing these facilities among the industries of the country in proportion to the needs of the people. In order to accomplish this end, we believe it is essential to do more than to grant a priority for the transportation of all fuel, leaving other commodities to secure what facilities they can. We, therefore, protest against the order of the Car Service Commission issued June 2nd, known as Circular CCS-33.

If the transportation facilities of the country are so inadequate that priorities must be established, then we believe that priorities for the transportation of fuel should be restricted to the transportation of fuel for essential industries and that other commodities, including food products and construction materials, should be given a definite standing as to their right of trans-

portation over less essential commodities and luxuries.

Under present rulings when the crying need for construction and increased production is nation-wide, and when the inadequacy of transportation facilities to meet the full demands of all industry is openly recognized, construction materials are left to scramble with luxuries and the least essential commodities for transportation service. The result is the greatest confusion and uncertainty, as shown in the accompanying statement from general contractors from all parts of the country.

We respectfully submit that if there is a shortage of transportation facilities, then these facilities must be shared by all industry on some known and equitable basis; that the principle which should govern the distribution of these facilities is the relationship of the needs of the people to the products of the industries of the country; and that food, fuel, shelter, and the tools of production and transportation, including construction, should be given definite preference over luxuries and less essential commodities.

In order that the present uncertainty and confusion may be alleviated, we respectfully petition your body to rescind Circular CCS-33, and in its place issue an order which will inform the industries of the country definitely on what basis they may expect to share the present transportation facilities and which will assure each industry of its proper share of those facilities in proportion to its importance in supplying the needs of the people.

Respectfully submitted,
THE ASSOCIATED GENERAL CONTRACTORS,

By G. W. Buchholz, Secretary.

Iowa Mineral Aggregates Now Plentiful

THE IOWA STATE HIGHWAY COMMISSION reports: "The material situation for the state seems well in hand so far as gravel and sand for road building is concerned. There appears to be ample supplies for all work which has been contracted. The field crew for the materials and testing departments has been in Dickinson county for some time locating and testing deposits for both Dickinson and the Clay county project. Private parties are arranging to develop deposits near Milford. The work of locating materials for the Kossuth county work will come next. Aggregate prices range the same as previously reported: \$1.50 per cu. yd. for washed and screened gravel, \$1.00 for pit run and 75c for sand."

New West Coast Glass Sand Enterprise

A NEW GLASS SAND PLANT, the first of any size on the Pacific Coast, is under construction at Pacific Grove, Calif., for the Del Montes Properties Co.

of San Francisco. This is the holding corporation of the well known canning concern.

There is a small glass plant at Los Angeles and considerable glass has been manufactured at other points in small quantities from sand shipped from the Ottawa, Ill., district and imported from Belgium and other foreign countries.

The new plant of the Del Montes Properties Co. will be erected by the company's own labor after plans made by the Lewistown Foundry and Machine Co., Lewistown, Penn., which will also furnish the entire equipment, consisting of screens, washing, drying and conveying machinery. The plant will have a capacity of about 300 tons per day.

Edwin Cross, superintendent of the Lewistown Foundry and Machine Co., recently returned from the West Coast and reports this the first glass sand washing and drying plant to be erected there, so far as he knows. Mr. Cross has built many glass-sand plants in West Virginia, Pennsylvania, Ohio, and other centers of the silica sand industry.

Liberty Potash Company in Receiver's Hands

THE LIBERTY POTASH CO., which was organized by Salt Lake City interests for the extraction of potash from leucite in Wyoming, is in the hands of the Bankers Trust Co. as receiver. Efforts are now being made to re-finance the company with the intention of putting the plant in operation again. It is reported that about \$800,000 was raised originally for the construction of the plant at Green River, Wyo., and that subsequently an indebtedness of about \$300,000 was contracted in its operation, making a total of \$1,100,000 represented in the venture.

The lack of adequate technical direction in the design and operation of the plant is assigned as one of the reasons for the failure of the company. Potash in the form of chloride equivalent to 35 per cent K₂O was produced to the extent of about twenty-one carloads.

Spanish Potash in Grip of Germans

SPANISH potash production will be placed in German hands and German capital and labor will be prominently employed therein, according to a recent report.

Two German potash experts, Herr Gunte and Herr Ziervogel, have just returned from a trip to Spain to look over the situation, as a result of which they report that the Spanish Government will probably grant the German potash syndicate wide concessions for working the Spanish potash deposits and for the production of the derivatives of potash.



Accident Records—How to Compile Them and How to Use Them

(Prepared by the Engineering Department of the National Safety Council)

THIS IS THE SECOND of a series of articles prepared especially for ROCK PRODUCTS, begun in the June 19 issue.

Temporary Disabilities

In the standard tables suggested, the classification "Temporary Disabilities" is divided into three classes; over two weeks, one week to two weeks, and one week and under. These divisions are made because in some states accidents are compensable after the first week, while in others they are compensable only after the second week. For comparing plants and industries located in different states these subdivisions are desirable.

Accident Severity Rates

To supplement the accident frequency rate it is desirable to determine also the rate of accident severity. By indicating the severity of all injuries on the basis of time lost, which is more definite and stable than the wage loss, we obtain an accurate measure of the hazards of any plant, department, or operation, and of the results accomplished by accident prevention work. Accident severity should be computed in terms of days lost per 1,000 hours worked. In computing days lost by temporary disabilities, the actual duration of disability in working days should be used. The day of the accident should be counted as the first day.

To make the severity record complete, some account must be taken of fatal accidents and permanent disabilities. A scale of arbitrary equivalents for such injuries, in terms of days lost, is advocated by the International Association of Industrial Accident Boards and by the U. S. Bureau of Labor Statistics and will be found in Bulletin 201 of that Bureau. Some members of the Council keep a separate record of fatal and permanent injuries.

Classification by Causes

The classification of accidents by causes is of the utmost importance, be-

cause it directs attention to those conditions in the plant which require correction. Nearly every accident results from a combination of causes. Authorities agree, however, that accidents should be ascribed to the proximate or immediate cause—"to that condition or circumstance, the absence of which would have prevented the accident; but if there be more than one such condition or circumstance, then to the one most easily prevented."

For example, a workman passing through an aisle, which is insufficiently lighted, stumbles upon a defective floor and throws his hand into an open gear which crushes off two of his fingers. Under this ruling, the accident is charged to the gear and not to stumbling or insufficient lighting, for had the gear been properly guarded, the workman would not have suffered the injury which he did—the loss of two fingers—though he might have been otherwise injured by his fall.

(To be continued)

Ninth Annual Safety Congress

EVERYONE INTERESTED in decreasing industrial accidents is invited to the Ninth Annual Safety Congress at Milwaukee, Wis., September 27 to October 2. There are special sectional meetings devoted to quarry and cement mill practice. Arrangements can undoubtedly be made for sectional meetings of other interested groups in the rock products industries.

ROCK PRODUCTS maintains this department of the paper in co-operation with the National Safety Council for its value to its readers and for the good of humanity. ROCK PRODUCTS urges every reader who can possibly do so to attend this safety congress and to put a little more pep into accident prevention work in our industries.

A Fatal Blasting Accident

By Oliver Bowles, Mineral Technologist, and J. E. Crawshaw, Explosive Testing Engineer, U. S. Bureau of Mines

ON APRIL 19, 1920, a fatal explosion occurred in a limestone quarry in Pennsylvania causing the death of six

men and injury to three others. The conditions were somewhat unusual and are illustrated in Fig. 1. The shot that was being prepared consisted of six 5½-in. well-drill holes in a single row. The line of holes crossed a depression that had at one time been used for the bed of an inclined track. Thus, as shown in Fig. 1, two of the holes were on a bench about twenty feet higher than the other four holes. The approximate depth of holes No. 1 and 2 was 73 ft.,

Ninth Annual Safety Congress "BACK TO MILWAUKEE" Sept. 27 to Oct. 2, 1920



Since Milwaukee was the scene of the First Congress, it is fitting that this splendid new convention hall—the MILWAUKEE AUDITORIUM—should house the entire activity of the Ninth Congress.

From the standpoint of achievement the Annual Safety Congress ranks as one of the most important conventions held in America.

One hundred and seventy-five speakers—men of national reputation—specialists representing every phase of safety and industrial betterment work will address the various meetings. The experiences of the past year will be reviewed, and a new and more intensive program developed for the coming year.

"The Annual Safety Show"—covering 46,000 sq. ft. of floor space—will present under one roof a thoroughly comprehensive display of up-to-date appliances and equipment for safeguarding the health and lives of workers.

For detailed information write W. H. Frater, Business Manager National Safety Council Co-Operative—Non-Commercial 168 North Michigan Avenue Chicago, Illinois.

and of Nos. 3, 4, 5 and 6, 55 ft. On account of previous blasting operations the rock was in a shattered condition, and hole No. 1 was found to be blocked with rock fragments so that it could not be loaded. It seemed desirable, therefore, to load hole No. 2 with a heavy charge in order to compensate for the absence of a charge in hole No. 1. As the blast under consideration was small, a blasting expert was not employed, though it is customary to employ an expert for all large shots.

A line of cordeau detonating fuse was placed in hole No. 2, no electric detonators being used in the hole. After 12 or 13 cases of 40 per cent nitro starch powder had been poured into the hole in loose form, it was found that a space of only 17 ft. remained for stemming. It was decided that space for an additional case of powder might be obtained by tamping the charge. The tamping was done with a heavy plunger, about 3 or 3½ in. in diameter and 10 in. long, made of lead with an iron core with an iron eye in the top to which a ¼-in. rope was attached, and weighing between 30 and 40 pounds. This weight was intended for use in sinking explosive in wet holes, and not for tamping. It is estimated that the tamping had continued at least 10 minutes. The quarry superintendent had gone a considerable distance for a box of powder, returned, and reached a point about 10 ft. from the hole, when the charge exploded, instantly killing the man who was tamping and injuring the superintendent and shovel runner who was also nearby. A group of men were occupied in baling water from the holes in the lower bench, and the rock hurled down killed five of them and injured another.

Similar Accidents

A number of similar accidents have occurred elsewhere, and the following may be cited:

In November, 1918, while a 70-ft. drill hole was being loaded with 4 by 10-in. cartridges of 50 per cent nitro starch powder at a cement quarry, a cartridge probably got caught crossways in the drill-hole. While attempting to clear the drill-hole by the use of a tripod rammer, the explosive was fired prematurely. The tamping bar on this rammer was a wooden bar 4 in. in diameter and about 40 in. long and at the time of the accident was probably being raised from 5 to 6 ft.

In January, 1907, at Pedro, Miguel Locks, Canal Zone, a 50-ft. hole was being loaded with 500 pounds of dynamite. For a tamping bar a cocobola stick, 2 ft. 6 in. long, and about 2 in. in diameter, which weighed about 12 pounds was used. This stick was lifted by an attached rope, and dropped on to the explosive. After about 300 pounds had

been added and tamped, the powder exploded prematurely.

In December, 1912, at Balboa, Canal Zone, while a drill hole was being loaded with dynamite, a rock fell down the hole, closing it up. While an attempt was being made to dislodge the rock with an 18-ft. steel drill, the powder in the hole exploded.

In October, 1912, near Empire, Canal Zone, a workman was tamping 16 sticks of 45 per cent straight nitroglycerin dynamite in a 9½ ft. hole with a steel drill bar 12 in. long, weighing 15 pounds, when a premature explosion took place.

In August, 1909, at Miraflores Locks, Canal Zone, while loading dynamite through an iron pipe, the iron pipe became clogged. While attempting to clear the pipe by tamping down hard with a wooden pole, the explosive detonated prematurely.

Conclusions

There are certain important conclusions to be drawn from the accident first described, to which careful consid-

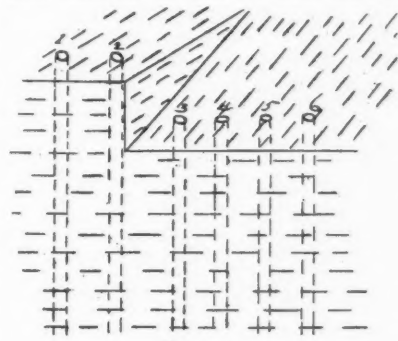


Fig. 7.

eration should be given by every quarryman.

1. The explosion seems to have been caused by hard tamping with a heavy plunger. With a smooth and regular drill hole such tamping might be conducted without accident, but in an uneven hole having jagged rock projections it seems likely that the heavy plunger impinged with sufficient force on a rock projection to generate the heat necessary to fire a thin film of explosive that may have covered it. Also the shaly condition of the rock in which the hole was drilled probably was a contributing cause. The small particles of rock loosened by the raising and dropping of the weight fell down into the explosive and were ground up by the tamping, making the explosive more sensitive to both friction and impact. Also, possibly some part of the iron constituting the core and eye of the plunger may have come in contact with siliceous rock projections and thus fired the charge. The use of a heavy tamping bar should therefore be carefully avoided.

2. It is evident that for all purposes

a wooden tamping bar should be used. The use of a wooden tamping bar has been urged repeatedly by the Bureau of Mines. (See Miners' Circulars Nos. 9 and 19; Technical Paper No. 111; and Bulletins Nos. 17 and 160.) Even with a wooden tamping bar the tamping should not be continued beyond the minimum time necessary.

3. If it is found necessary to use a lead plunger to sink powder in wet holes, it should be provided with a copper rather than an iron eye. The subjecting of any explosive to frequent impacts with any heavy weight is dangerous practice.

4. A circumstance of extreme importance, is that it resulted in undue loss of life, was the employment of men on a lower ledge adjacent to a face back of which explosive was being placed. The holes of the lower bench should have been loaded first and all workmen removed from the lower bench before loading hole No. 2. Under such circumstances the premature explosion would have resulted in one fatality and two injuries rather than six fatalities and three injuries. While it is unusual to have a single line of holes occupying two benches, the general principle should be followed that workmen should never be allowed at the base of a quarry face after loading has begun, and the presence of workmen on the rock area between the line of holes and the face should be avoided as far as possible.

5. Every quarryman will observe that the conditions surrounding this shot were quite unusual, and it seems desirable to point out that accidents are much more likely to happen under unusual circumstances than under familiar conditions. Extraordinary conditions result in unusual activities, and the latter involve greater risk. Quarry operators should, therefore, give more careful supervision to blasts of unusual character than to regular blasts where all operations are standardized.

6. The Bureau of Mines has pointed out (see Technical Paper No. 203, pp. 15-16) that the employment of thoroughly competent blasting experts is to be recommended. Such experts are employed for large shots in the quarry under consideration, but it seems advisable to extend this practice to include all primary blasts.

7. Quarrymen should familiarize themselves with the various safety rules promulgated by the Bureau of Mines and should endeavor on every occasion to put them into practice. Such rules are contained in various publications, a number of which have already been referred to in this paper. They may be obtained upon application to the Director of the Bureau of Mines, Washington, D. C.—U. S. Bureau of Mines, Reports of Investigations.

General News from Rock Products Markets

Indiana Operators Object to Trotting to Washington on Every Rate Matter

THE HEARING before the Indiana Public Service Commission recently of the complaints of all shippers and receivers of shipments registered unanimous opposition to priority or other discriminatory measures, and a desire to have the police power of the Interstate Commerce Commission delegated to the states insofar as local business is concerned. The mass of shippers object to going to Washington for every little service they may need; they claim that some agency nearer home would be more convenient and efficient. The Esch-Cummins Railroad Law was pronounced an absolute failure by several.

The switchmen's strike, indifference of some railway officials toward new business, the lack of railroad equipment, the inability of the railroads to move the cars they have, the favoring of some classes of shippers at the expense of others, the moving of railroad equipment from Indiana west to handle western grain first, the restriction of contract coal in favor of free coal which sells at a much higher price, were discussed as some of the causes of the present car shortage.

A resolution appointing a committee composed of one man from each industry to confer with the Public Service Commission on the best plan to approach the Interstate Commerce Commission on the matter, was unanimously adopted. President Huffstetter will represent the Indiana Sand and Gravel Producers' Association.

Indiana Eliminates Retained Percentage on Completed Road Work

HIGHWAY CONTRACTORS in the state of Indiana have secured the consent of the State Highway Commission to advance to contractors engaged in building state highways, 100 per cent of the contract price per mile upon completion of each mile of road. Settlement on this basis will not be final, but will be subject to adjustment up till the time the whole is completed. The proportion advanced on each completed mile heretofore has been limited to 80 per cent.

Conferences held at Indianapolis between the highway contractors and the state highway commissioner during June, led to the adoption of the plan. The new arrangement must be approved by the State Board of Accounts before it can be put into effect.

Big Increase in Memphis Building

MEMPHIS, Tenn.—Building activity in Memphis for the first five months of the year totals \$3,398,830, or an increase of \$1,425,725 over the corresponding period of last year, according to the building inspectors office; 102 brick and stucco residences totaling \$768,400 are included. Brick and concrete mercantile building \$485,200.

The gravel and sand firms at Memphis report brisk June business and some improvement with the cessation of rain and lower water in the river. Building demand and road demand very large.

Cement Makers Disagree on Freight Rate Increases

REPRESENTATIVES of the cement industry who appeared before the Interstate Commerce Commission June 21, in the advanced rate case were not in agreement as to how the proposed increases in rates should be applied—by the percentage method or by the flat increase of so many cents a hundred pounds.

F. E. Paulson of Allentown, Pa., general traffic manager of the Lehigh Portland Cement Co., appeared for more than a score of cement companies scattered throughout the country. He urged a flat advance rather than a percentage increase, because a flat advance would have less tendency to disarrange the industry.

Walter Young, general traffic manager of the Atlas Portland Cement Co., said that his company favored the percentage increase, because, under the flat increase, the nearby producer paid a larger portion of the increased cost incident to the general transportation in order that the long distance producer might be privileged to ship his goods to the consumer and to that extent exclude the goods of the nearby producer.

Questions asked by Commissioner Aitchison indicated that he believed that the cement companies could assist in relieving the present congestion by confining deliveries to their own districts instead of making long hauls to compete with other industries.

Incidentally Commissioner Aitchison has displayed a very unsympathetic attitude toward all the building supply industries, where his power as commissioner in charge of the car service section gives him the opportunity to be of real help in the present transportation crisis.

Iron Founders Balk at Prospect of Dollar Ore Freight Rate

STONE, sand and gravel men were in Washington, D. C., the week of June 13, protesting a further advance in freight rates on these commodities. It was shown that the average freight rate for a 100-mile haul on these commodities at the present time is around \$1 or more per ton, with a plant value of the material about the same.

According to "Iron Age" the very prospect of paying a dollar a ton on iron ore from Cleveland and Lake ports to Youngstown and the other centers of the steel industry of the Mahoning Valley is arousing the active opposition of the iron and steel men. The haul from these Lake ports to Youngstown is 100 miles in round figures, or about the same as the haul on crushed stone or gravel, and the value of the ore is five to ten times the value of stone or gravel, f.o.b. shipping point.

The "Iron Age" says: "The request of the Baltimore & Ohio Railroad for a flat advance of 22 cents a ton on iron ore from the lower Lake ports to Valley furnaces in addition to the proposed general freight increase, is unfavorably regarded by pig iron makers. The present charge is 65 cents a ton, which would be increased to 87 cents by the 22-cent advance and still higher by the general increase. It is estimated the advances would add about 48 cents a ton to the freight charge from the Lakes to the Mahoning Valley, or about \$1 to the cost of iron per ton. While iron ore producers and consumers favor an equitable advance, they believe the proposed charge is excessive and are prepared to oppose it. Increases in the price of ore and the carrying charges as now proposed would add approximately \$3 per ton to the cost of pig iron and would effectually block any price decline."

Great Western Sugar Co. to Build New Plant

ANNOUNCEMENT has been made that the Great Western Sugar Co. is to erect a 600-ton plant in Weld County, Colorado, at the junction of the Union Pacific and Great Western railroads. This plant is expected to be ready for operation by next October and is similar to the Brighton plant.

This plant will have a great advantage in being situated in one of the finest sugar beet-growing sections in Colorado.

This means a big new consumer of high calcium stone for Colorado quarriesmen.



NEW MACHINERY EQUIPMENT



Storing Coal by Means of Scoop Conveyors

AN INTERESTING APPLICATION of scoop conveyors for storing coal is shown in the accompanying view, illustrating five portable conveyors made by the Portable Machinery Co., Passaic, N. J., being used to unload coal from hopper-bottom cars direct to storage pile. Four of these machines are 12 in. wide by 24 ft. long, the other one being 12 in. by 20 ft. Each is equipped with its own electric motor and can be operated singly if desired.

These machines provide a convenient, efficient and flexible arrangement. The

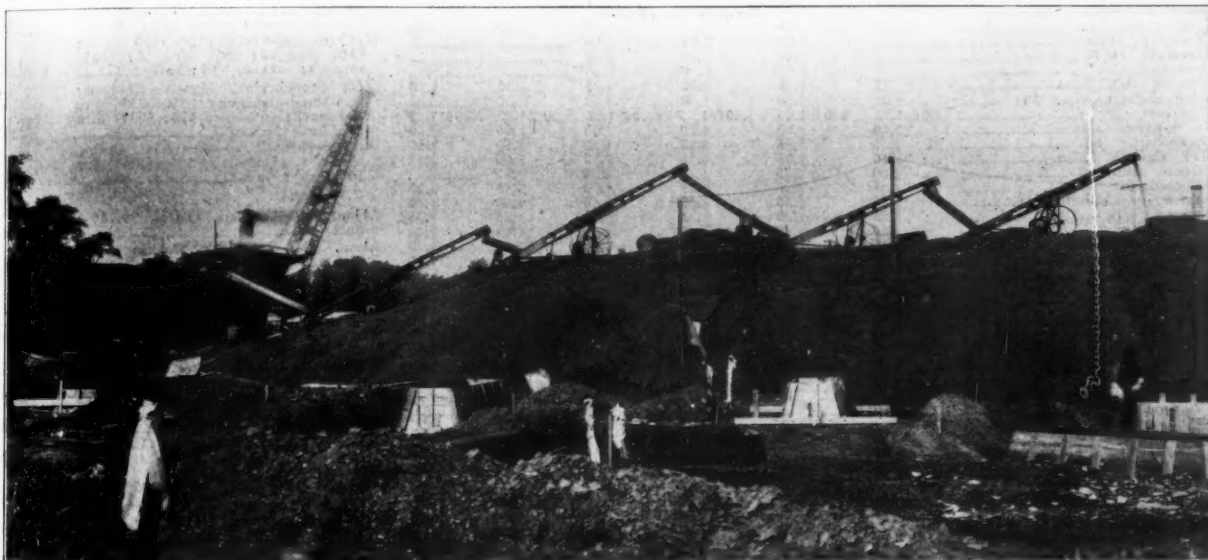
always be used to better advantage for general work about the plant.

A great advantage of using the scoop conveyor to unload hopper bottom cars is the fact that no track hopper or pit is necessary. This makes it possible to unload cars at any point along the track. To unload a car, the scoop or feed end of the machine is placed near or under the car hopper. The hopper door is then released and the belt on the scoop conveyor carries the material away as fast as it flows through the hopper opening.

A number of installations in the rock products field have already been made. The portable conveyor units are of course equally useful for handling lime.

New Loader Skip

A LABOR-SAVING DEVICE, known as the Lightning Loader Skip, has recently been put on the market by Collins & Webb, Inc., of Los Angeles and San Francisco. The loader skip has proved itself most efficient in unloading material from open cars into motor trucks, cutting down the time consumed in unloading and thus increasing profits. Contractors who have given the "Lightning Loader Skip" a trial, state that they can now make two trucks do the work of three. Attached to any open railroad car it keeps the men constantly busy and the trucks always on the move.



Unloading coal a distance of 150 ft. with five scoop conveyors

first machine is practically self-feeding from the hopper doors of the car and the other four may be swung around at any angle to cover a wide storage area. Five machines arranged in this manner can be operated by one or two men. They can also be used to convey the coal direct from storage pile into boiler room or to the kiln firing floor of a lime plant. Where desired, one machine can be used to load an electric storage battery truck to convey the coal directly into the boiler room or the pulverizing plant of a cement mill.

The advantages of using several 20 ft. or 24 ft. conveyors are quite obvious. One long conveyor would not be as portable. It would be more difficult to adjust and handle and the shorter units can



Recovering coal and conveying it to boilers or kilns with same conveyors

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

City or shipping point	Crushed Limestone					
	Screenings, ½ inch down	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger	
EASTERN:						
Buffalo, N. Y.	1.00	1.40 per net ton, all sizes	2.50	2.00		
Burlington, Vt.	1.80	1.80	1.80	1.65	2.00@2.25	
Coldwater, N. Y.	1.45	2.50	2.40	2.00	1.60	1.45
Grove, Md.	1.00	1.00	1.00	1.00	1.00	1.00
North Leroy and Akron, N. Y.	1.00					
Utica, N. Y.	1.00					
Vernoy, N. J.	2.00	2.25	2.00	1.80	1.60	
CENTRAL:						
Alden, Ia.	.80	1.50	1.50	1.45		
Alton, Ill.	2.00	1.75	1.75	1.75	1.75	
Bettendorf, Ia.		1.50 per cu. yd., all sizes				
Chicago, Ill.	1.20	1.60	1.30	1.20	1.30	1.20
Cincinnati, Ohio		2.00	2.00	2.00		
Cleveland, Ohio		2.40	2.20	2.20		
Davenport, Ia.	1.50*	1.50*	1.50*	1.50*		
Dundas, Ont.	.75	1.50	1.50	1.35	1.25	1.20
Eden and Knowles, Wis.	1.20	1.20	1.20	1.20	1.20	
Elmhurst, Ill.	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25
Ft. Wayne, Ind.	1.60	1.90	1.90	1.80	1.60	
Greencastle, Ind.	1.25	1.25	1.10	1.10	1.10	1.10
Hull, Canada	2.50	2.30	2.50	2.10	2.00	1.75
Illinois, Southern	2.00	1.50	1.50	1.50	1.50	
Kokomo, Ind.	1.15	1.25	1.25	1.20	1.10	1.10
Krause, or Columbia, Ill.	1.80	1.30	1.50	1.40	1.30	1.30
Lannon, Wis.	1.25	1.25	1.25	1.25	1.25	1.25
Lima, Ohio	1.40	1.40	1.40	1.40	1.40	1.40
Mansfield, Ohio	1.70	2.20	2.00	1.90	1.70	1.70
Mayville, Wis.	1.00		1.20@1.25	1.20	1.10	
Montrose, Ia.	1.25	1.75	1.75	1.65@1.75	1.65@1.75	
Oshkosh, Wis.		1.40 per net ton, all sizes				
River Rouge, Mich.	1.25	1.50	1.50	1.50	1.50	1.25
Silica, Ohio	1.00	1.50	1.30	1.20	1.00	1.00
St. Louis, Mo.	.60	1.60				
Toledo, Ohio, f. o. b. cars	1.60	2.10	1.90	1.80	1.60	1.60
Toronto, Canada	1.55	2.25	2.25	2.25	2.05	2.00
Winnipeg, f. o. b. cars	2.90*		3.25*	2.90*		
SOUTHERN:						
Brooksville, Fla.	1.50		3.00			
Cartersville, Ga.		2.75	2.75	2.75	2.50	
Chickamauga, Tenn.	1.50	1.75	1.75	1.75	1.75	
El Paso, Tex.	1.00	1.00	1.00	1.00		
Fort Springs, W. Va.	1.30	1.50	1.85	1.75	1.60	1.50
Garnett, Okla.	.65		1.65	1.50		
Mascot, Tenn.		1.50	2.00	1.50@2.00		
New Braunfels, Tex.	.60	1.75	1.75	1.50	1.50	
WESTERN:						
Atchison, Kans.	.50	2.00	2.00	2.00	1.90	1.90
Blue Springs and Wymore, Neb.	.20	1.85	1.85	1.75@1.80	1.65@1.70	1.60
Kansas City, Mo.	.60	2.00				
Mankato, Minn.				1.75	1.50	
Terminus, Calif.		1.00			.90	

Crushed Trap Rock

City or shipping point	Screenings, ½ inch down	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Bernardsville, N. J.	2.00	2.20	2.00	1.80	1.50
Bradford, Conn.	.80	1.75	1.65	1.45	1.25
Birdsboro, Pa.	1.40	1.90	1.80	1.60	1.40
Bound Brook, N. J.	2.10	2.30	2.00	1.80	1.60
Dresser Jct., Wis.	.75	2.45	2.45	2.15	2.00
Duluth, Minn.	1.00	2.25	2.00	1.50	1.50
E. Summit, N. J.	2.10	2.35	2.15	1.80	1.85
Glen Mills, Pa.	1.00	1.35	1.70	1.85	1.35
Millington and Paterson, N. J.	1.80	2.20	2.00	1.80	1.60
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60@1.00	1.60@1.80	1.60@1.80	1.40@1.50	1.20@1.30
San Diego, Calif.		1.30@1.60	1.25@1.55	1.15@1.45	1.10@1.40

Miscellaneous Crushed Stone

City or shipping point	Screenings, ½ inch down	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Dundas, Ont.—Flint	1.10	1.10	1.10	1.10	1.10
Mayville, Wis.	.90@1.00	1.10@1.25	1.10@1.25	1.10@1.25	1.10@1.25
Middlebrook, Mo.—Granite	4.00	2.00	2.00		1.50†
Portland, Maine—Granite	1.50			1.25	
Roseburg, Ore.		1.50	1.25	1.05	1.00
Stockbridge, Ga.—Granite	.50	2.00	1.90	1.75	
White Haven, Pa.—Sandstone	.85	1.20	1.40	1.20	1.20
Granite	1.25		1.50	1.50	

*Cubic yard. †Agrl. lime. ||R. R. ballast. §Flux. ‡Rip-rap. a 3-inch and less.

Agricultural Limestone

EASTERN:	
Coldwater, N. Y.—Analysis, 56.77% CaCo ₃ , 41.74% MgCo ₃ —70% thru 200-mesh, 95% thru 40-mesh; bags, \$5.00; bulk	3.25
Chaumont, N. Y.—Analysis: CaCo ₃ , 92 to 98%; MgCo ₃ , 1.51%—(Thru 100 mesh); sacks, 4.00; bulk	2.50
Grove City, Pa.—Analysis: CaCo ₃ , 94.75%; MgCo ₃ , 1.20%—(70% thru 100 mesh); 80 lb. ppr., 4.60; bulk	3.25
Grove, Md.—(50% thru 50 mesh); paper bags, 6.75; bulk	5.00
Hillsville, Pa.—Analysis, CaCo ₃ , 96% (70% thru 100 mesh); sacks, 4.50; bulk	2.75
Jamesville, N. Y.—68% thru 100 mesh; 95% thru 50; 100% thru 20. Sacks, 3.75; bulk	2.25
Syracuse, N. Y.—Analysis, 90% carbonates (50% thru 100 mesh, 90% thru 50 mesh); sacks, 3.50; bulk	1.75
Walford, Pa.—(70% thru 100 mesh; 85% thru 50; 50% thru 50; 100% thru 4); sacked, 4.25; bulk	2.75
West Stockbridge, Mass.—Analysis: Combined carbonate, 95%—33% thru 200 mesh; 66% thru 100; 100% thru 40. Bulk	2.85
Williamsport, Pa.—Analysis, CaCo ₃ , 88-90%; MgCo ₃ , 3-4%—(50% thru 50 mesh); bulk	4.00
CENTRAL:	
Alden, Ia.—Analysis, CaCo ₃ , 99.16%; bulk	.80
Alton, Ill.—Analysis: CaCo ₃ , 96%; MgCo ₃ , 0.75%—50% thru 4 mesh	2.50
Bedford, Ind.—(90% thru 10 mesh) Analysis, CaCo ₃ , 98.5%; MgCo ₃ , 0.5%	1.75
Belleville, Ont.—Analysis, CaCo ₃ , 90.9%; MgCo ₃ , 1.15% (45 to 50% thru 100 mesh; 61 to 70% thru 50 mesh); bulk	2.50
Chicago, Ill.—Analysis, CaCo ₃ , 53.63%; MgCo ₃ , 37.51%—90% thru 50 mesh	1.00
Columbia, Ill., near East St. Louis (¾" down)	1.25@1.80
Ellettsville, Ind.—Analysis, Carbonate, 98%	2.00
Elmhurst, Ill.—(Analysis, CaCo ₃ , 35.73%; MgCo ₃ , 20.69%) 50% thru 50 mesh	1.25
Greencastle, Ind.—(Analysis, CaCo ₃ , 98%) 50% thru 50 mesh	1.75
Howenstein, O.—100% thru 10 mesh; 59% thru 50; 39% thru 100	2.75@3.00
Kansas City—(50% thru 50 mesh)	2.00
Lannon, Wis.—(90% thru 50 mesh) Analysis, 54%, CaCo ₃ ; 44%, MgCo ₃	2.00
Marblehead, O.—(Analysis: CaCo ₃ , 95.33%) 100% thru 100 mesh, sacks, 4.75; bulk	2.75
McCook, Ill.—Analysis, CaCo ₃ , 54.10%; MgCo ₃ , 45.04%—100% thru ¾-in. sieve; 78.12% thru No. 10; 53.29% thru No. 20; 38.14% thru No. 30; 34.86% thru No. 50; 22% thru 100	1.50
Milltown, Ind.—Analysis, CaCo ₃ , 94%; MgCo ₃ , 3%—(100% thru 4 mesh)	1.50
Montrose, Ia.—(90% thru 100 mesh)	1.25
Piqua, O.—Analysis: CaCo ₃ , 82.8%; MgCo ₃ , 8.2%; neutralizing power in terms of calcium carbonate, 95.3%—50% thru 100 mesh; bulk	2.75@4.50
Rockford, Ill.	1.50
Stolle, Ill. (near East St. Louis on I. C. R. R.)—(Thru ¾" mesh) Analysis, CaCo ₃ , 89.61 to 89.91%; MgCo ₃ , 3.82%	2.00
St. Paul, Ind.—Analysis, CaCo ₃ , 85%; MgCo ₃ , 12%	1.50
Stone City, Ia.—Analysis, CaCo ₃ , 98% (50% thru 100 mesh)	.80
Toledo, O.—Analysis, CaCo ₃ , 52.72%; MgCo ₃ , 43%—(20% thru 100 mesh); 30% thru 50; 80% thru 100; 100% thru 5/32 screen	1.80
Whitehill, Ill.—Analysis, CaCo ₃ , 96.12%; MgCo ₃ , 2.50%—50% thru 100 mesh	2.00

(Continued on next page.)

Agricultural Limestone

(Continued from preceding page.)

SOUTHERN:

Cartersville, Ga.—Analysis: 96% combined carbonates—All thru 10 mesh with all dust in..... 2.75

Claremont, Va. (Maritime) — Analysis, 90.94% CaCo₃, 0.31% P., 1.36% Mg., 0.37% S.; bulk..... 4.50
100 lb. per bags..... 6.00
100 lb. cloth bags..... 6.50Dittlinger, Tex. — Analysis, CaCo₃, 99.09%, MgCo₃, .04%.
90% thru 100 mesh..... 2.00
90% thru 4 mesh..... 1.00Grovania, Ga.—Analysis, CaCo₃, 95%; MgCo₃, none—50% thru 100 mesh..... 2.50Hopkinsville, Ky.—Analysis, 94.6 to 98.1% CaCo₃—Bulk..... 2.00Linnville Falls, N. C.—Analysis, CaCo₃, 54%; MgCo₃, 42%—50% thru 100 mesh; sacks, 4.00; bulk..... 2.50Marion, Ga.—Analysis, 90% CaCo₃—(50% thru 100 mesh)..... 2.00Memphis Jet, Ky.—(Analysis, CaCo₃, 95.31%; MgCo₃, 1.12%); average price, 1/4 in. down..... 2.00Masco, Tenn.—Analysis, CaCo₃, 52%; MgCo₃, 38%.
(80% thru 100 mesh)..... 3.00
(All thru 10 mesh)..... 2.50
(80% thru 200 mesh)..... 5.00

Paper bags, \$1.50 extra per ton; burlap, 2.00 extra per ton..... 2.50

Maxwell, Va.—Analysis, CaCo₃, 76.6%; MgCo₃, 22.8%—100% thru 20 mesh; sacks, 6.00; bulk..... 5.00Ocala, Fla.—Analysis, CaCo₃, 98%—(75% thru 200 mesh)..... 4.50Tyrone, Ky.—Analysis, CaCo₃, 90%; MgCo₃, 4%—90% thru 4 mesh..... 1.75@2.25

Winfield, La.—(50% thru 50 mesh)..... 3.00

WESTERN:

Cement, Calif.—50% thru 50 mesh..... 4.00

Colton, Calif.—Analysis: CaCo₃, 95%; MgCo₃, 1 1/2% (all to pass 14 mesh)—bulk, 3.50; bags..... 4.50

Sacks, 15c extra, returnable.

Kansas City, Mo., Corrigan Sidg—50% thru 50 mesh; bulk..... 1.35

Terminus, Calif.—Analysis, 94% CaCo₃, 1.4% MgCo₃—(60% thru 200 mesh; 90% thru 100 mesh; 100% thru 40 mesh); sacks, 6.00; bulk..... 5.25

Miscellaneous Sands

Silica sand is quoted washed, dried and screened, unless otherwise stated.

GLASS SAND:

Berkeley Springs, W. Va..... 2.50@3.00

Special hand selected rock..... 2.50

Fridgeton, N. J..... 2.00

Cedarville and South Vineland, N. J.—Glass, damp..... 2.00

Glass, dry..... 2.50

Gray Summit, Mo..... 2.50@3.00

Guion, Ark.—Carlots..... 2.50

Hancock, Md.—Damp..... 2.00

Klondike and Pacific, Mo.: Contracts..... 2.00

Carlots..... 3.00

Mapleton, Pa..... 3.00

Glass, damp..... 2.50

Massillon, Ohio..... 3.50

Michigan City, Ind..... .75

Millington, Ill.—Contracts..... 2.00

Mineral Ridge, O..... 3.50

Montoursville, Pa.—Green, washed..... 2.00@2.75

Oregon, Ill.—Large contracts..... 2.00

Open market..... 2.50

Ottawa, Ill..... 2.00@2.50

Robinson, Md., washed, screened, not dried..... 2.00

St. Marys, Pa.—Green..... 2.50

Sands, Elk Co., Pa.—Selected, green..... 3.00

Thayers, W. Va.—Washed..... 3.50

Dried..... 4.00

Tygart, Ky.—Washed, not dried..... 2.60

Utica, Ill..... 1.75@2.50

FOUNDRY SAND:

Albany, N. Y.—Core..... 1.25@2.00

Furnace lining..... 2.25@2.50

Molding, fine coarse and brass..... 2.50@2.75

Sand blast..... 3.75@4.50

Allentown, Pa.—Core..... 1.50@1.75

Molding coarse..... 1.50

Arenzville, Ill.—Molding fine..... 1.75@2.00

Beach City, Ohio—Core..... 2.75

Furnace lining and sand blast..... 3.00

Molding fine and coarse..... 2.50@3.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine sand, 1/10 inch down	Sand, 1/4 inch and less	Gravel, 1/4 inch and less	Gravel, 1 inch and less	Gravel, 1 1/2 inch and less	Gravel, 2 inch and less
EASTERN:						
Ambridge, South Heights, Pa.	.....	1.30	.....	1.30	1.00	1.00
Attica, N. Y.	.75	.75	.75	1.00	1.00	1.00
Farmingdale, N. J.	.68	.48	1.50	1.35	1.35	1.30
Hartford, Conn.	.90	.....	1.25	1.15	1.15	1.15
Leeds Junction, Me.	.....	.50@.60	1.75@2.00	1.50	.....	1.35
Ludlow, Mass.	.....	.75*	.....	1.70*	1.50*	1.50*
Washington, D. C.	.75	.75	2.00	1.40	1.20	.....
CENTRAL:						
Alton, Ill.	.60@.75	.60@.75	1.50@4.50	1.30	1.20	1.20
Anson, Wis.	.....	.60@.70	.....	1.25@1.50	.....	1.00@1.20
Attica, Covington, Silverwood, Ind.	.85	.85	.85	.85	.85	.85
Barton, Wis.	.85	.70	1.00	.80	.80	.80
Chicago, Ill.	.....	1.50	.....	1.50	.....	.....
Columbus, Ohio	.....	.70	1.00	.70	.....	.70
Des Moines, Ia.	.75@1.00	.75	1.65	1.50	1.50	1.50
Earlestead (Flint), Mich.	.60	.70	1.05	.95	.95	.95
Eau Claire, Wis.	.....	.60@.70	1.25@1.50	.....	1.00@1.25	.....
Elgin, Ill.	.....	.80	1.00	.80	.80	.80
Elkhart Lake, Wis.	.75	.60	1.00	.84	.84	.84
Grand Rapids, Mich.	.....	.60	.....	.90	.83	.83
Greenbush, Mich.	.50	.80	1.00	1.25	1.25	.....
Greenville, Mechanicsburg, O.	.70@.80	.60@.70	.60@.70	.70@.80	.60@.70	.60@.70
Humboldt, Ia.	1.00	.85	1.90	1.90	1.90	1.90
Le Mars, Ia.	.....	.90	.....	1.60	1.60	.....
Mason City, Ia.	1.00	.....	2.00	1.90	1.85	1.75
Milwaukee, Wis.	1.20	1.30	1.30	1.30	1.30	1.30
Minneapolis, Minn.	.50	.....	2.00	2.00	1.75	1.50
Moline, Ill.	.80	.80	.....	1.20	1.20	1.20
Oxford, Mich.	.....	.65	.75	.....	.....	.....
Pittsburgh, Pa.	.....	1.30	2.20	1.95	1.85	1.85
Riton, Wis.	.....	1.50	1.70	1.50	1.45	1.45
Saginaw, Mich., f. o. b. cars	1.30	1.30	1.70	1.50	1.45	1.45
St. Louis, Mo., f. o. b. cars	1.50	1.55	1.70	1.50	1.45	1.45
Terre Haute, Ind.	1.00	1.00	.....	1.00	1.00	1.00
Toledo, Ohio	.75	.75	.....	.....	.....	.....
Winnipeg, f. o. b. cars	.....	.....	2.00 per cu. yd.	.....	.....	.....
Yorkville, Moronts, Oregon and Sheridan, Ill.	.70@.85	.80@.90	.80@1.00	.70@.85	.70@.80	.65@.75
SOUTHERN:						
Knoxville, Tenn.	1.15	1.15	1.50	1.50	1.50	1.40
Lake Weir, Fla.	.....	.75	.....	.....	.....	.....
Lincoln, Neb.	.90	.....	2.20	2.20	.....	.....
Macon, Ga.	.....	1.00	.....	.....	.....	.....
Memphis, Tenn.	1.40	1.40	1.50	.....	.....	1.50
N. Martinsville, W. Va.	.....	1.10	.....	.....	1.00	.....
New Orleans, La.	.....	1.40*	3.00*	.....	.....	.....
Pelzer, S. C.	.80	.....	.....	.....	.....	.....
Pine Bluff, Ark.	1.25	.95	.....	.....	.....	.....
Pueblo, Colo.	.95*	.75*	.....	.....	1.50*	2.00*
Roseland, La.	.....	.35	.....	.....	1.25	.....
Tulsa, Okla.	.....	.70	.....	.....	.....	.....
Waco, Texas	.70@.80	.70@.80	.....	.....	.....	1.10
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.	.....	(Kaw River sand, car lots, .75 per ton, Missouri River, 1.50)	.....	.....	.....	.....
Niles, Calif.	1.00	1.00	.90@1.10	.85@1.00	.85@1.00	.85@1.00
Saratoga, San Jose, Calif.	.....	.60@.75	.60@.70	.60@.70	.60@.70	.60@.70
Seattle, Wash.	1.25	1.25	2.00	1.25	1.25	1.25
Vancouver, B. C.	.....	1.30*	.....	1.30*	1.20*	1.20*
Yorkville, Ore.	.60	.60@.75	.70	.60@.75	.60	.50@.60
Bank Run Sand and Gravel						
City or shipping point	Fine Sand, 1/10 inch down	Sand, 1/4 inch and less	Gravel, 1/4 inch and less	Gravel, 1 inch and less	Gravel, 1 1/2 inch and less	Gravel, 2 inch and less
EASTERN:						
Boonville, N. Y.	.60@.85	.60@.80	.....	1.00	.90	.90
Fishers, N. Y.	.....	.90@1.00	.....	.....	.....	1.00
Hartford, Conn.	1.00*	.....	.....	.....	.....	.....
Yardville, N. J.	.....	.50@.75	.....	.....	.....	.....
York, Pa.	.....	1.20@1.40	.....	.....	.....	.....
CENTRAL:						
Earlestead, (near Flint, Mich.)	.....	.....	.60 per yd.	.....	.....	.....
Elkhart Lake, Wis.	.....	.70 per ton (washed concrete material)	.....	.....	.....	.....
Ft. Jefferson, Mechanicsb'g, O.	.70	.60	.60	.....	.....	.....
Grand Rapids, Mich.	.....	.40	.....	.75	.80	.60
Greenbush, Mich.	.65	.....	.....	.....	.....	.....
Hersey, Mich.	.....	.70	.70	.70	.70	.60
Illinois, Northern	.....	.....	.....	.....	.....	.50@.60
Janesville, Wis.	.....	.65	.....	.....	.....	.....
Lincoln, Neb.	.....	.....	.....	.....	.....	.....
Oxford, Mich.	.....	.....	.....	.....	.....	.....
Saginaw, Mich., f. o. b. cars	.....	.75	1.30	1.30	1.30	1.30
St. Louis, Mo., f. o. b. cars	1.60	1.60	1.60	1.60	1.60	1.60
Summit Grove, Ind.	.65	.65	.65	.65	.65	.65
Toledo, Ohio	.....	.....	.....	.....	.75	.....
Yorkville, Oregon, Moronts and Sheridan, Ill.	.....	.....	.....	.....	.....	.....
SOUTHERN:						
Albany, Ga.	.70@1.00	.....	.....	.....	.....	.....
Dudley, Ky. (Crushed Sand)	.....	1.05	.....	1.00	.....	.50@.75
Lindsay, Tex.	.....	.....	.....	.....	.....	.60@.75
Valde Rouge, La.	.....	.....	.....	.....	.....	.95
Waco, Texas	.....	.....	.....	.....	.....	.....
WESTERN:						
Pueblo, Col.	.....	.....	.....	.....	.....	.....
Saratoga, San Jose, Calif.	.60@.75	.60@.70	.60@.70	.60@.70	.60@.70	.60@.70
Yorkville, Ore.	.40	.....	.....	.....	.40	.....

* Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag

City or shipping point	Roofing	1/4 inch down	1/4 inch and less	1/2 inch and less	3/4 inch and less	2 1/2 inch and less	3 inch and larger
EASTERN:							
Bethlehem and Emaus, Pa.	2.50	.90	1.50	1.20	1.20	1.20	1.20
Buffalo, N. Y.	2.00	1.00	1.00	1.00	1.00	1.00	1.00
E. Canaan, Conn.	4.00	1.10	2.00	1.50	1.50	1.35	1.00
Erie, Pa.		1.25	1.25		1.25	1.25	1.25
Emporium, Pa.		1.25	1.25		1.25	1.25	1.25
Hokendaugua and Donaghmore, Pa.	2.50	.90	1.50	1.20	1.20	1.20	1.20
Lebanon, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Philadelphia Dist.	2.50	1.20	1.50	1.20	1.20	1.25	1.25
Pittsburgh, Pa., Dist.	2.05	1.15	1.50	1.15	1.15	1.15	1.15
Sharpsville and Struthers, Pa.	2.00	1.20	1.60	1.20	1.20	1.20	1.20
CENTRAL:							
Chicago, Ill.		All sizes, \$1.50, F. O. B. Chicago					
Detroit, Mich.		All sizes, 1.65, F. O. B. Detroit					
Ensley, Ala.	2.05	1.00	1.10	1.25	1.25	1.00	.95
Ironton, Jackson, O.	2.00	1.25	1.60	1.25	1.25	1.25	1.25
Toledo, O.		All sizes, 2.00, F. O. B. Toledo					
Youngstown, Dover, Hubbard and Leetonia, O.	2.00	1.20	1.60	1.20	1.20	1.20	1.20
SOUTHERN:							
Ensley, Ala.	2.05	1.00	1.25	1.25	1.25	1.00	.95
Longdale, Goshen, Glen Wilton and Low Moor, Va.	2.50	1.00		1.25	1.25	1.15	1.05

Agricultural Lime and Hydrate

	Agricultural Lime—Bulk	Agricultural Lime—Bags	Per Cent CaO	Per Cent MgO	Agricultural Hydrate—Bags
EASTERN:					
Adams, Mass.			98	38	8.00
Bellefonte, Pa.	8.50		98.5	.72	11.50
Berkeley, N. J.		14.00	.50	.18	
Bridgeport, Pa.	7.50@9.00		55	44	9.00@11.00
Cavetown, Md.	8.50				
Cedar Hollow, Devault, Rambo and Swedeland, Pa.	8.00	10.75 grd.	58	38	10.75
Chippewa, Pa.	6.00@6.50		78.67	1.33	
Farnams, Mass.	6.00	7.50	60	2	
Frederick, Md.	7.75		88	5 to 8	10.50
Grove, Md.	8.00				10.75
Highgate Springs, Vt.		8.00	85	2	
Hollisburg, Pa.	5.50@7.50		94.68		
Hyndman, Pa.	5.00	8.50	80.23	2.87	
Lime Kill, Md.	8.00	10.75			10.75
Lime Ridge, Pa.	5.25@6.50		80.56-62.56	3.87-1.75	
Newburgh, N. Y.		57	38		8.00
New Castle, Pa.	3.50	4.50	47.6 to 50.4	0.62 to 1.12	
Paxtang and Lemoyne, Pa.	4.00@6.00		60	12	
Rosendale, N. Y.	8.00	9.00	92	5	
Union Bridge, Md.	8.50		73	1	10.75
Williamsport, Pa.	6.50		62-68	2-3	11.00
West Rutland, Vt.	5.00	8.00	68	3	
York, Pa.	8.00		90-95	2-7	10.75
CENTRAL:					
Alton, Ill.	10.50		94.0		
Delaware, O.			50.0	5-12	10.50
Forest, O.	7.50				
Knowles, Wis.		9.00	55	45	11.50
Manistique, Mich.	11.00		95	2	11.00
Mitchell, Ind.					12.50
Sheboygan, Wis.			58	40.5	
Springfield, Ohio	5.50	8.50	30.68	33.34	13.00
Woodville, Ohio			46-50	30-35	13.00
SOUTHERN:					
Blowers, Fla.	5.00	7.25	98.0		
Burns, Tenn.	10.00		96	0.54	14.00
Chippewa, Fla.	5.00		80.0	15.0	
Dittlinger, Texas		9.00@11.00	98.62	0.29	12.50@15.00
Erin, Tenn.	9.50		97.82	0.12	
Knoxville, Tenn.	2.50				14.00
Lushing, Va.	9.00	11.25	60	15	12.75
Maxwell, Va.	6.00	9.00	88	1.75	
Newala, Ala.	8.50@9.00		99.33		
Ocala, Fla.	4.00	6.00 pulv.	98 1/4	(dry basis)	
Staunton, Va.	9.00	11.50	80.00	15.00	
WESTERN:					
Colton, Calif.		4.50	97	2	15.00
Kirkland, N. Mex.		12.50			
San Francisco, Calif.			96	0.33	15.00
Tehachapi, Cal.		6.00	96	2	

Miscellaneous Sands

(Continued from preceding page)

Bowmantown, Pa.—Core	1.30@1.50
Molding, coarse	2.00@2.40
Bridgeton, N. J.—Core	2.00
Cleveland, O.—Molding coarse	2.50
Brass molding	2.50
Molding fine	2.00@2.50
Core	1.50@2.00
Columbus, O.—Core	1.00
Brass molding	2.50
Furnace lining	2.50
Molding fine, steel molding	2.50
Conneaut, O.—Molding fine	2.25@2.50
Molding coarse	2.00@2.25
Delaware, N. J.—Molding fine	2.00
Molding, coarse	1.90
Brass Molding	2.15
Eau Claire, Wis.—Core	.70
Roofing gravel	2.25
Sand blast coarse	3.50
Sand blast medium, fine	3.00

Fleetwood, Pa.—Furnace lining	2.25
Franklin, Pa.—Traction	2.25
Brass molding	2.50
Molding fine, steel molding	2.50
Molding coarse, fine, green	2.25
Sand blast	5.00
Core	2.50
Greenville, Ill.—Molding coarse red	1.75@2.25
Guion, Ark.—Molding fine	2.00@2.25
Roofing	3.00
Stone sawing	2.50
Hancock, Md.—Core and brass mldg.	1.65
Hellam, Pa.—Core	2.00@2.50
Joplin, Mo.—Stone sawing, flint	1.25
Kansas City, Mo.—Missouri River core	.85
Klondike and Gray Summit, Mo.—Molding fine	2.00@2.50
Lake Weir, Fla.—Sand blast	.60
Mapleton, Pa.—Core, furnace lining, molding fine and coarse damp	2.50
Core, furnace lining, molding, fine and coarse, dry	3.00

Massillon, O.—Molding fine	3.00
Molding coarse	3.00
Traction	3.00
Furnace lining	3.50
Core	3.00
Michigan City, Ind.—Core, bank	.75
Traction	.50
Millington, Ill.—Core and furnace	2.50
Core, washed	1.50
Mineral Ridge, O.—Core, molding, sand blast, roofing, etc., washed, screened (damp)	2.50@3.00
Glass sand	2.50@4.00
Montoursville, Pa.—Traction	1.50@2.00
Brass molding, fine, core	1.75@2.25
Glass sand	2.50@2.75
Ohio—Various points:	
Iron molding, fine	1.50@2.25
Iron molding, coarse	1.75
Brass molding, minimum	2.00
Oregon, Ill.—Core, furnace lining, molding fine, brass molding	2.50
Sand blast, molding coarse	3.50
Ottawa, Ill.—Crude silica sand	1.00
Providence, R. I.—Molding fine	2.00
Molding coarse	1.90
Brass molding	2.25
Sand blast	3.00@4.00
Ridgeway, Pa.—Glass sand, green	2.25
Glass sand, wash	2.50
Molding, fine and coarse	1.20
Thayer, Pa., Traction	2.00
Furnace lining, molding, coarse	1.25
Molding, fine	1.50
Core, washed	2.50
Core, green	2.00
Tygart, Ky.—Core and stone sawing	2.60
Fire-brick sand, washed but not dried	2.15@2.40
Utica, Pa.—Core	2.00
Molding fine	2.50
Molding coarse, traction	2.50
Brass molding	2.50
Sand blast	3.50
Warwick, Ohio—Core, furnace lining, molding fine and coarse (dry)	3.00
Core, furnace lining, molding fine and coarse (green)	2.50
Wetron, Ill.—Core, (crude silica)	.75@1.00
Molding fine, coarse	.75@1.00
West Albany, N. Y.—Molding fine	1.75@2.25
Molding coarse	1.50
Brass molding	1.75
Zanesville, Ohio—Molding fine and brass	2.25@2.50
Molding coarse	2.00@2.25

Gypsum, per Ton

Castalia, O.—Crushed, to cement mills	3.50
Ground, to cement mills	3.50
Land plaster	6.00
Bags extra—Jute, 3.00; ppr., 1.00.	
Fort Dodge, Ia., bulk	3.50
Garhutt, N. Y.—Land plaster, bags	7.50
Grand Rapids, Mich.—Crushed gypsum	4.50
Ground gypsum rock	9.00
Gypsumville, Man., Can. (crushed)	3.50
Oakfield, N. Y.	7.50
Sandusky, O.	6.00
Jute sacks, \$3.00 extra; paper, \$1.00 extra.	

Ground Rock Phosphate

Centerville, Tenn.—B. P. L., 70%; ton, 2000 lbs. (90% thru 100 mesh)	10.00
Lump rock, 72% to 75%, B. P. L.	6.00@8.50
Centerville, Tenn.—B. P. L., 65%	8.25
B. P. L., 70%	9.00@9.50
Brown rock, 75% and better	12.00
Gordonsburg, Tenn.—2000 lbs. (90% thru 100 mesh)—B. P. L., 60%	6.00
B. P. L., 65%	7.00
B. P. L., 70%	8.50
B. P. L., 75%	12.00
Lump rock, long ton, 70%	9.00
Mt. Pleasant, Tenn.—(B. P. L. 68%)	
13% phosphorus	7.00
14% phosphorus	8.00
Mt. Pleasant, Tenn.—B. P. L., 70%	7.50@10.50
Norwills, Fla.—Fla. Hard Rock (B. P. L., 77%)	13.50
Wales, Tenn. (95% thru 100 mesh) (guaranteed 14% phosphorus equiv.)	7.00@8.25
Walls, Tenn.—B. P. L., 70.2%	
To County Agri. Assns.	7.50
To others	7.75

Florida Soft Phosphate

Croon, Fla.—Ground pebble, 30%	16.00
Pulverized soft, 26%	17.50
Jacksonville (Fla.) District	10.00@12.00
(Add 2.50 for sacks)	
Phoslime, Fla. (in burlap bags, 100-200 lbs.)	15.00

General News from Rock Products Markets

Railways Promise Aid to Eastern Building Materials

RAILROADS TERMINATING in and near New York have by word and action put a more favorable aspect upon the immediate future of building construction, according to the Dow Service Daily Building Reports.

When it was shown that the completion of living quarters for several hundred families this autumn was dependent upon the immediate shipment of some twenty odd thousand barrels of cement the company pledged 50,000 barrels, if necessary, out of its reserve of 500,000 barrels if transportation could be arranged. When the matter was presented to Ralph Peters, president of the Long Island Railroad, through the Mayor's Committee, full co-operation was promised. Incidentally strong pressure is being brought to bear to put building materials next in line with food and fuel for railroad priority, with greater assurance toward the week end of actual accomplishment than had heretofore seemed likely.

While the building material supply situation in this city was still in the famine classification, with no cement, lime or plaster on hand in any of the dealers' yards, a glimmer of hope was found for partial relief in the action of the commercial interests of the city in attempting to unload some of the ships in the harbor. In some of these ships building materials have been awaiting unloading for three months. This relief will come in the form of Oklahoma plaster and lime supplies sent through Galveston some time ago when the railroad embargoes were in force.

As the building material market now stands, new projects are not receiving much consideration from any angle. The full legal rate for money in most of the Eastern states is making mortgage money on new projects, even housing enterprises, timid. Contractors, who a few months ago were complaining about scarcity of labor of all kinds, say they have an over-supply now, but cannot get materials are laying off surplus help.

But the great, big, hopeful outlook is in the changing condition at the building material mill centers. The entire building construction industry faced a mill shortage three months ago. Today there is estimated to be an adequate supply of materials on hand for almost a normal market between now and October. While this should not be interpreted as portending general price reductions, it at least removes the greatest single factor barring full resumption of building work when the transportation situation clears.

Contractors in the Northwest Would Restrict Construction

THE MEMBERS of the Northwestern Association of General Contractors unanimously decided recently in favor of a policy of voluntary restriction upon building construction as a means to aid in lowering prices. At a special meeting held at St. Paul, the following resolution was indorsed:

WHEREAS, Our country is suffering from social unrest, high cost of living and the world-wide credit strain, and

WHEREAS, This condition is primarily due to the vicious circle of price advances and the withdrawal of labor from essential productive industries, and

WHEREAS, There is as this time a general tendency to promote the construction of non-essential work, both public and private, which may, in general, be postponed for some months, and

WHEREAS, The construction of these works employ vast numbers of men and consume great quantities of materials, diverting from more essential productive industries the men and materials so employed, and

WHEREAS, The use of labor and materials consumed in non-essential work, if diverted to essential productive industries, would aid materially in producing a surplus of the necessities of life and so reduce the high cost of living, which must be accomplished if social unrest is to be permanently relieved;

Therefore, be it Resolved, That the Northwestern Association of General Contractors declare it to be their firm opinion that all work of whatever character which may, in the nature of the circumstances, be postponed without detriment to the public welfare, should be deferred until such time as the industry of the country has been able to create the necessities of existence in sufficient quantities as to bring the cost of living to a more reasonable basis; and

Be It Further Resolved, That the Secretary of this Association be instructed to give these resolutions such publicity as the Executive Committee of the Northwestern Association of General Contractors direct.

Exports of Cement Increasing

EXPORTS of cement during the month of April totaled \$759,769 in value, according to figures just secured from the Department of Commerce by the Washington Bureau of ROCK PRODUCTS. Our imports also showed a big increase over preceding months, a total of 25,447,500 pounds, valued at \$120,617 being received, as compared with imports totaling \$17,000 received during the month of March. Our export trade in cement is fast becoming an important factor in our foreign commerce, and will probably total nine million dollars or more for the fiscal year which ends with June.

Iowa Open-Top Car Situation Alarming

REPORTS from Muscatine, Iowa, which is a big sand and gravel producing center, state that not a car load of gravel is being moved because of the drastic order of the Interstate Commerce Commission directing the Middle West railways to rush open-top cars East.

The local gravel men, through the Muscatine Shippers Association and the Iowa Association of Gravel Producers, have filed formal protests with the commission at Washington, and a representative of the latter association has been in Washington conferring with the commission in an effort to have the ruling rescinded.

More Serious Than Expected

The commission's ruling, providing for the sending of 38,000 gondola cars to eastern lines in exchange for 20,000 box cars, which are being diverted to western lines, is proving much more serious than first expected, the local operators state.

Hampered all spring through inadequate transportation facilities and earlier in the season by weather unfavorable to work at their pits, they are now forced to see their machinery lying idle and orders piling up for want of cars to handle their output.

Were means of transportation adequate, the combined daily output of the three gravel producing concerns would exceed eighty carloads or almost two train loads, an official of one of the concerns said this afternoon.

Can't Get Box Cars

Shut off from their supply of gondola cars, the local concerns made an effort to secure box cars for the handling of their shipments, but the railroads refused to furnish even this kind of equipment, giving as their reason the shortage of box cars all over the grain belt.

Save for a small amount for the local trade, no gravel or sand is being taken from the Island pits.

These conditions are typical of the Middle West district west of the Mississippi River, while conditions east are not much better in Wisconsin and parts of Illinois.

The shortage of box cars for grain shipments is nearly as bad. After attempting to get results at Washington, Iowa business men have now sent a member of the state railroad commission to Chicago to work direct with the railroads.



Passed By The Screens



Incorporations

The Superior Portland Cement Co., Seattle, Wash., has increased its capitalization from \$1,500,000 to \$2,000,000.

The Houston Brick & Tile Co., Houston, Mo., has been incorporated for \$6,000. Barton & Impey of Houston, Mo., are the attorneys.

The American Agricultural Lime Co., Wilmington, Del., has been incorporated for \$750,000 to prepare for market limestone and other mineral deposits.

D. S. Henry Co., Springfield, Mass., has been incorporated for \$30,000 to deal in sand, gravel, etc. The directors are David S. Henry, president; John J. Toole, treasurer, and R. C. Thompson.

Sand and Gravel

The Reed Sand & Gravel Co., Burlington, Wis., has installed an entire new equipment in their pit, and the same is now in operation. It is what is known as a drag line system.

The Burruss Gravel Co., Shoals, Ind., has filed a petition with the Indiana Public Service Commission against the Baltimore & Ohio Southwestern Railroad Co., for the construction of a loading switch at the petitioner's gravel deposits.

The Constant Sand & Gravel Co., Denham Springs, La., has been incorporated for \$125,000. F. T. Constant is president and manager; George Bailey, treasurer, and T. T. Harrison, general manager. The company has purchased the Amite River gravel deposits, which they will develop. They are installing new machinery, and will build a spur track from Baton Rouge to the gravel beds. Later on, the company expects to build a glass plant.

The Elkhart Sand & Gravel Co., Elkhart Lake, Wis., has increased its capitalization from \$100,000 to \$200,000. The company now operates five plants in the vicinity of Elkhart Lake and part of the increased capitalization is to be used in opening another pit and putting in a plant. The other plants and equipment are to be improved and the business is to expand generally. The officers of the company are: A. A. Laun, Milwaukee, president; Jacob Reineck, vice-president, and Louis Laun, secretary-treasurer, both of Elkhart Lake.

Cement

The Sandusky Portland Cement Co., Syracuse, Ind., is spending \$150,000 to equip the plant for the manufacture of cement from limestone instead of marl. Great quantities of limestone will be shipped to Syracuse from Logansport and other Indiana towns.

S. D. Camp, Valmont, N. M., states that the cement plant he and associates are constructing at Valmont will soon be ready for operation. The proposal is to manufacture interior plasters from the white sands. The sands make a very good plaster. It will be prepared and shipped far and near.

The Alsen Cement Co., Alsen, N. Y., will be enlarged in every department next winter. The company will expend \$200,000 to improve the plant so that its capacity may be brought up to 4,000 barrels a day. In view of the enlarged capacity to follow the improvements, an order has been placed for a new crane to cost \$35,000.

The Atlas Portland Cement Co., Northampton, Pa., had its mill No. 2 shut down here because of the freight jam which has retarded the shipment of cement. This mill is the first to go down because of the railroad conditions, although many of the others have been storing their product. Coal cars are being used to ship cement, the cars being fitted with a temporary covering.

Berlin, N. Y.—Negotiations are pending for the purchase by local parties of a steep rocky bluff in Berlin as a site for the location of a cement plant, using the lime rock which is found in abundance in this locality. This ledge of rocks is owned by Caleb Bentley. Borings and drillings will be made soon, and from the drillings and excavations and taking of cores the pur-

chase price will be determined. The parties interested have already offered \$17,500.

The Lehigh Portland Cement Co., Metaline Falls, Wash., has closed down temporarily for about six weeks in order to make repairs. The burden of unfilled orders has drawn on the reserve store of the International Cement Co., causing a temporary shortage in cement, according to officials. The International was well equipped to fill its own orders, but with the added business it cannot fill the seasonal demand, now at its height. This district has only been operating on a 25 per cent production, but with the opening of the International's full equipment the plant will reach a 50 per cent production. With the opening of the Lehigh Portland Cement Co.'s plant again the district's production will reach a 100 per cent production.

The Acme Cement Co., Catskill, N. Y., after a shutdown of about three years, has resumed the manufacture of cement, turning out the same high quality product for which the plant has always been well known. Using the wet process which eliminates all dust, a higher quality product is turned out than is possible under other systems. The plant of the Acme company has a capacity of 3,000 barrels a day and shipments can be made by rail or water, as there is a railroad siding direct to the works and a long dock from the works to the channel of the river. Workmen under the direction of A. F. Carleson, the superintendent, have been busy getting the plant in shape since February and the works, which are of the most modern construction, are in readiness to turn out the plant's full capacity.

The Edison Portland Cement Co., New York, N. Y., has issued the following announcement: Effective June 1, 1920, the Edison Portland Cement Co. will adopt the practice of quoting a uniform delivered price on Edison cement, applicable to dealers and consumers alike. Recognized dealers will be allowed a 10 per cent trade discount from the delivered price, exclusive of the value of the package. This action has been deemed advisable in fairness to dealers, who are today receiving no more remuneration for their services than formerly when prices and costs of doing business were approximately half of what they are today—and to give contractors more stable prices by the elimination of the present uncertainty prevailing on the border line between territories having various differentials. The above in no way affects the present cash discount of 5c per barrel for payment of invoices within ten (10) days from date of shipment.

Quarries

The Kettle River Quarry Co., Sandstone, Minn., has made arrangements to reopen their quarry, again under new management to be known as the Sandstone Quarry Co. William Penn and John A. Smith are the leaders of the enterprise.

Chico, Texas.—A number of surveyors arrived in Chico very recently and are making a survey for the location of the Federal Crushed Stone Co.'s plant. The company is made up principally of Dallas, Texas, business men, and promises to be one of the largest plants in this section.

The Campbell Stone Co., Afton, Mich., whose plant was destroyed by fire a short time ago, causing a loss of \$75,000 on the building and machinery, will rebuild immediately. The machinery for crushing the sugar stone is still intact. The large force of men made idle by the conflagration will be employed in the reconstruction work.

The Puget Sound Marble & Granite Co., Seattle, Wash., announces the purchase of the business of the Toppennish Marble & Granite Works, Toppennish, Wash. This arrangement brings to Toppennish and the surrounding community the facilities and equipment of the largest marble and granite works in Washington. J. M. Vickers, the former proprietor, will remain as local manager.

The Marquette Stone Products Co., North McGregor, Ia., which was recently incorporated for \$100,000, has elected the following as officers: John Aramer, president; W. F. Bickel, vice-president; J. M. Berry, treasurer; Ernest Nicholson, treasurer. The directors are John Aramer, McGregor; J. J. Burke, Marquette; J. M. Berry,

Marquette; J. W. Boyle, McGregor; John J. Arnold, Waukon.

The Watertown Stone Products Co., Watertown, N. Y., has been incorporated for \$100,000 by S. D. Ormsby and C. Mae Ormsby of Belleville and M. J. Davis of Watertown. The purpose of the company is to produce and deal in crushed stone, ground limestone and general products. A modern plant will be built of 200 tons capacity daily. The stone at the quarry has been tested and found to be of high grade for railroad ballast, highway and general construction. In addition to the crushing equipment, a supply of large bins for the storage of crushed screened and graded stone will be built. A railroad siding with room for five cars at a time will be installed on one side of the storage bins, and on the other side will be equipment for the loading of trucks for local demand. The plant will be run the year around and a considerable number of men will be given steady employment.

Lime

The Annville Lime Co., Annville, Pa., has been reorganized because of the death of John A. Deitzler, president and general manager of the corporation. Sherman C. Deitzler succeeds his father as president and general manager; Paul J. Deitzler was made secretary and assistant manager, and Arthur G. Deitzler was elected treasurer.

The American Limestone Co., Mascot, Tenn., is having extensive improvements made on its plant, which will double its output. Additional driers, tube mills, loading equipment, and about a mile of sidetrack are being constructed. The work is expected to be completed by August 1. Forty carloads of pulverized lime can be shipped daily when the improvements are completed. A steam shovel was also recently installed to handle the storage pile, which contains 500,000 tons of pulverized lime. This only needs to be taken through the drying process before it is ready for the market.

Manufacturers

The Ingersoll-Rand Co. of Illinois and A. L. Cameron Steam Pump Works, Chicago branch, announce a change in address. Their offices are now located at 709 Fisher Bldg., Chicago, Ill.

The Traylor Engineering & Manufacturing Co., Allentown, Pa., have just issued Bulletin 101 describing their new superpump and hydraulic machinery. The bulletin is very complete and contains a great deal of information that will appeal to users of pumping machinery.

The Worthington Pump & Machinery Corporation announces the purchase from the Platt Iron Works, Dayton, Ohio, of their drawings, patterns, jigs, templates, special tools, good will and name on their following lines of product:

1. Oil mill machinery.
2. Hydraulic turbine and water wheel line.
3. Feed water heaters.
4. High pressure air compressors for torpedo and other high pressure charging, cleaning and discharging.

OBITUARY

J. C. Gittings, Jr., vice-president and general manager of the Thomasville Stone & Lime Co., Thomasville, York County, Penn., was killed recently at his lime plant by being caught between two freight cars. Mr. Gittings was a son of James C. Gittings, Baltimore, Md., president of the company, and was one of the best known and popular young men of the Eastern lime industry.

Philip F. Duffy, salesman for the Wisconsin Lime & Cement Co., died of heart failure in the offices of the company in the Chamber of Commerce building in Chicago. Mr. Duffy was 56 years old, and had been a salesman with the cement company for five years. His philanthropic impulses caused him to give away his fortune of \$50,000 to charity, and because of this he became dependent upon his salary for a livelihood.

CLASSIFIED ADVERTISING

Rates for advertising in the Classified Department: \$2.50 per column inch per insertion. Minimum charge, \$2.50. Please send check with your order. These ads must be paid in advance of insertion.

Situation Wanted

WANTED

By an engineer 34 years old to get in touch with reliable company or parties who can use and appreciate the services of a HIGH-GRADE, industrious man with 12 years' experience in the actual operation and management of large quarries and lime plants.

Am familiar with large operation embracing steam shovels, locomotives and big crushing units, besides production methods, cost data, the use of explosives and handling and organizing men.

Will be available in about two weeks. Address

Box 1415

Care Rock Products

SITUATION WANTED

High grade quarry executive desires engagement. Thoroughly experienced in handling steam shovel and large production; efficient, energetic organizer. Connection with dependable and progressive company desired where results are appreciated. Address

Box 1414

Care of Rock Products

SUPERINTENDENT

Young man, technical graduate, experienced in construction and operation of lime and crushing plants and quarries, having a thorough knowledge of economical production, heavy blasting and efficient upkeep of machinery.

Box 1417

Care of Rock Products

T. Nelson Dale

Geologist of the U. S. Geol. Survey and author of U. S. G. S. Bulletins on Slate, Granite and Marble, in view of the termination of his relations to the Survey by the "Retirement Act" on Aug. 20 of this year, will become a Consulting Geologist in problems pertaining to the quarrying of Slate, Granite, Marble, Lime-rock, and to the drilling for water.

Address: The Oaks, Springfield, Mass.

Help Wanted

Mechanic Wanted

Unusual opportunity for man who is fairly familiar with operation of No. 500 eight-mold rotary press, of American Clay Machinery Co. make. Please state experience.

Box 1416, Care of Rock Products

Wanted

A man experienced in the operation of vertical lime kilns and capable of managing a small plant. State experience, references, and salary expected. Address

Box No. 1408, c/o Rock Products.

Plants for Sale

For Sale

First-class stone quarry in central Iowa. On Lincoln Highway near city of 20,000. Three railroads; 40 ft. face, 100 rods long. Recommended by State Highway Commission for road building purposes. Closest competition eighty miles. Stand closest inspection.

Box 1410

Care Rock Products

Miscellaneous

WANTED

Responsible parties to erect and operate a hydrated and agricultural lime producing plant on my property at Bronson, Michigan, formerly owned by the Bronson Portland Cement Company, located on N. Y. C. R. R. 200 acres fine marl land with commodious steel and cement buildings with large storage capacity already built. Also sidetrack on property connecting with main line of R. R., office buildings, dredges, etc. Location, two miles from city. Main Lincoln Cement Highway ¼ mile from plant. Desire to furnish marl, buildings and equipment on hand on royalty basis. Plant surrounded by finest agricultural lands in Michigan and Indiana. Large demand for products. Capital required, \$150,000.00 to \$200,000.00.

F. M. RUDD

Bronson, Michigan

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Complete Information Service—Just ask us when you desire catalogs or information in a hurry. No charge. For quick action use this form.

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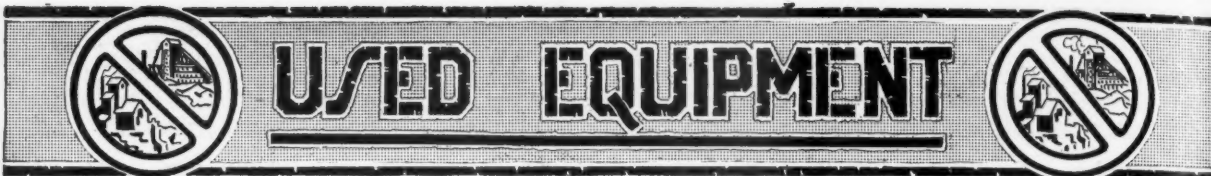
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Rates for advertising in the Used Equipment Department: \$2.50 per column inch per insertion. Minimum charge, \$2.50. Please send check with your order. These ads must be paid in advance of insertion.

STONE CRUSHERS

Offered for prompt inspection and shipment—

Two CHALMERS & WILLIAMS No. 6 Gyratory Crushers. Both standard rear drive. Have two arm spiders and suspended shafts. Smooth concaves, corrugated heads, of chilled iron. One never used, the other has seen but light service and shows no wear. Located in New Jersey.

We have many others—Gyratory Type from size No. 2 to No. 9. Jaw Type from 8x14 in. to 30x60 in. Also several Symons Disc Machines, Crushing Rolls, Pulverizers, etc.

Try us also for LOCOMOTIVE CRANES, STEAM SHOVELS, LOCOMOTIVES, CARS, RAILS, HOISTING ENGINES, DERRICKS, GRAB BUCKETS, AIR COMPRESSORS, CABLEWAYS, ETC.

Wm. B. Grimshaw Co., 1048 Drexel Bldg., Phila., Pa.

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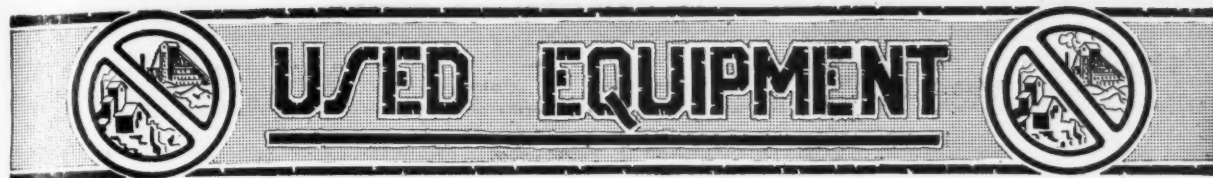
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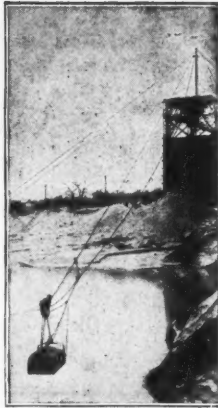


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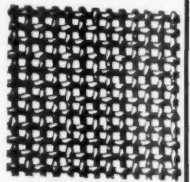
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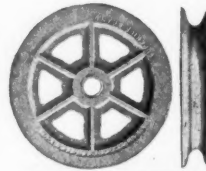
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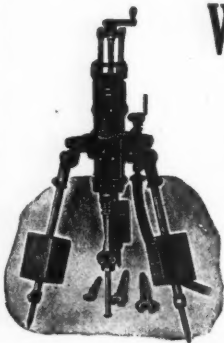
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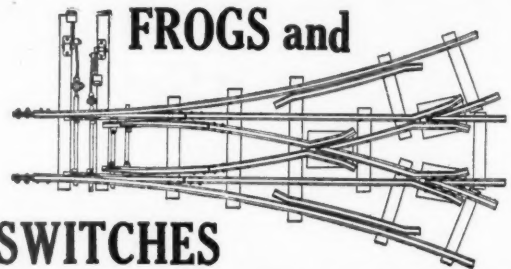
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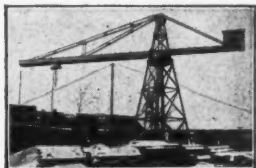
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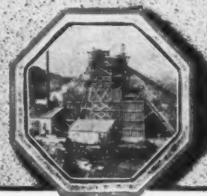
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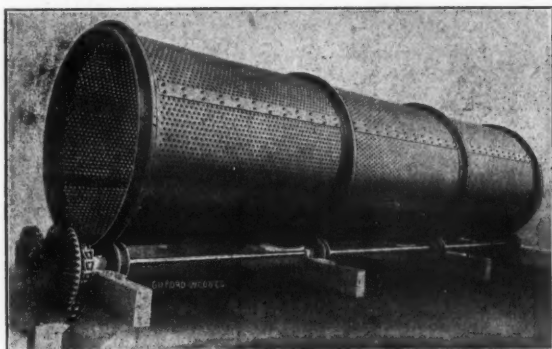
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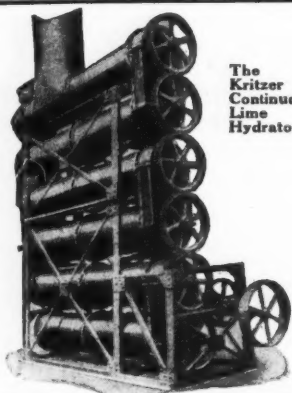
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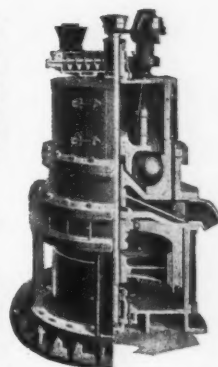
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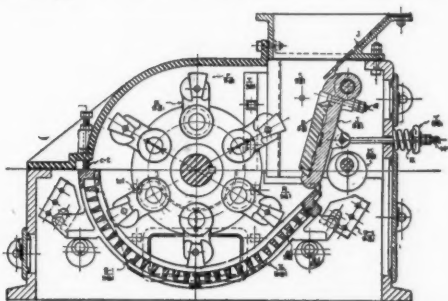
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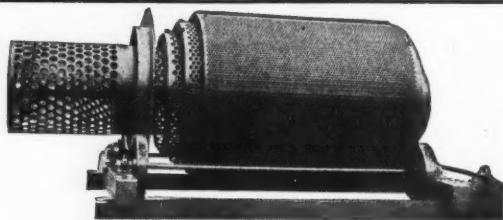
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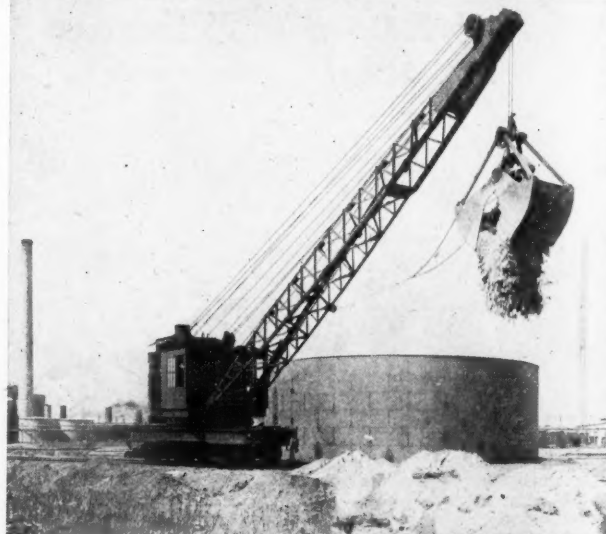
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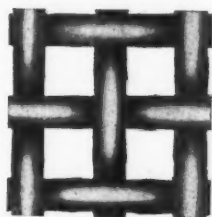
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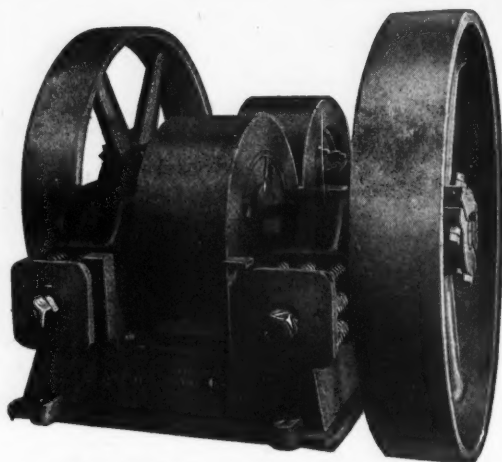
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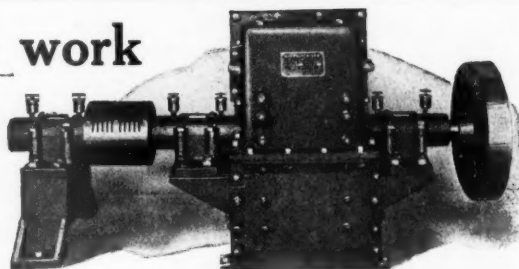
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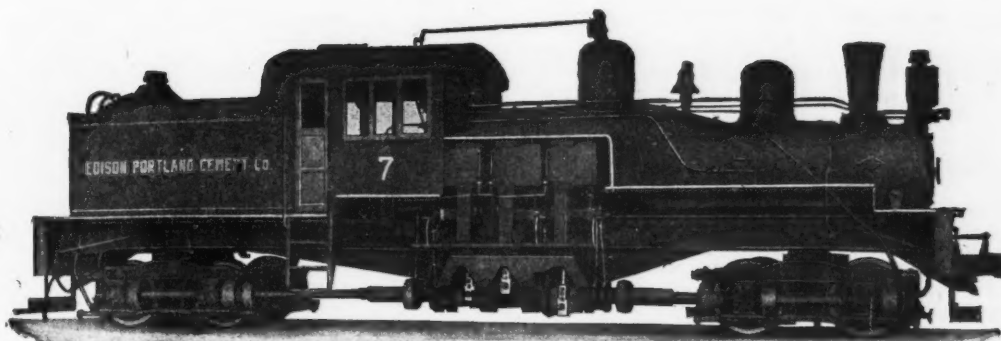
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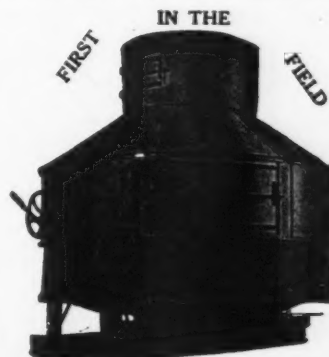
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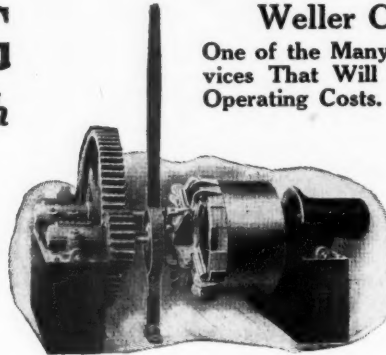
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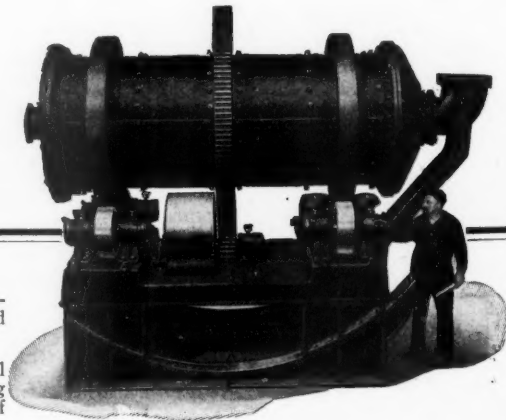
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MARATHON MILL

The Marathon Mill operates with a charge of round steel bars, the full length, which thoroughly pulverize and evenly mix all lumps of lime with the sand, the latter also being ground at the same time to just the proper fineness, according to adjustment. Tests prove the Marathon Mill has a greater capacity at a perfect mix than two Wet Pans and takes half the horsepower, giving the Marathon four times the advantage over ordinary methods. We have information of value to the manufacturers of Sand-Lime Brick. Send for it TODAY.

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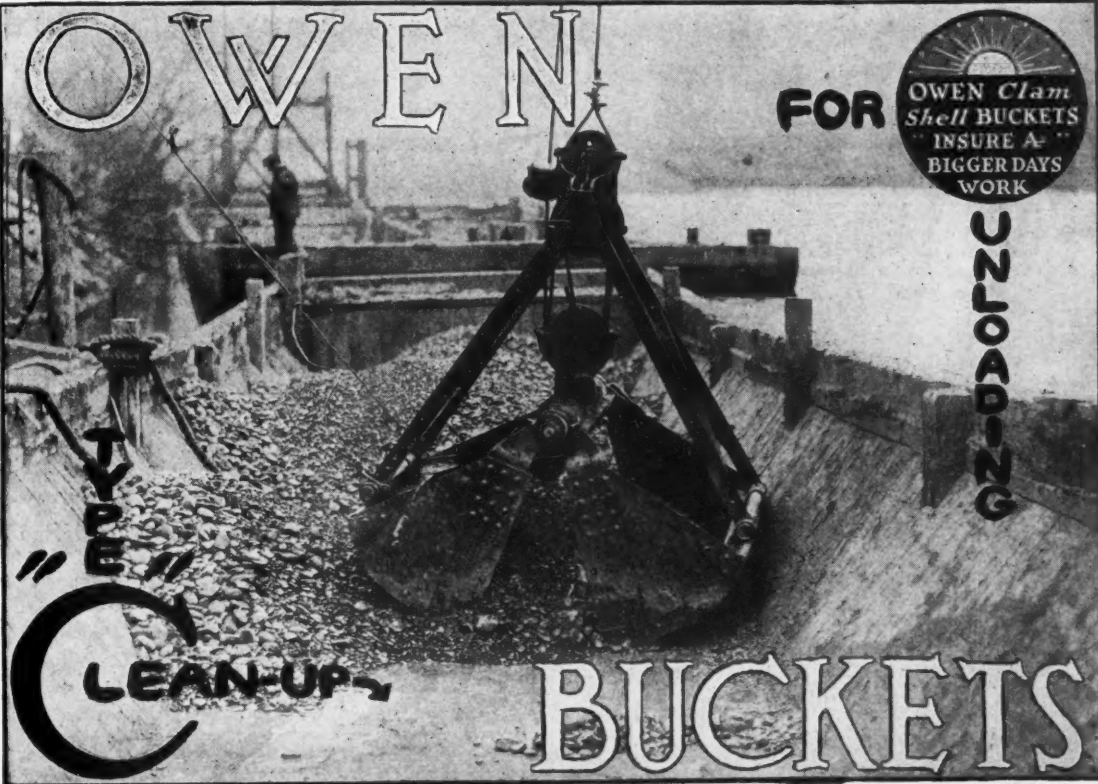
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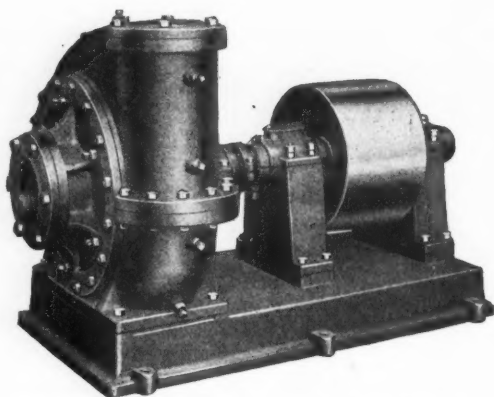
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It is a better pump for all dredging work than any other on the market, because when any of the parts are worn, they can be easily replaced, so that the pump itself will last indefinitely; while with all other pumps of the same class, parts that are worn must be entirely discarded. The ease of interchangeability on the Morris pump makes it the most economical as an investment.

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SAND PUMPS

NOW COMES THE Tank Crawler Steam Shovel

VRB Steam Shovels are now available, mounted on an improved tank crawler truck.

In the war, tanks proved their utility beyond a shadow of doubt.

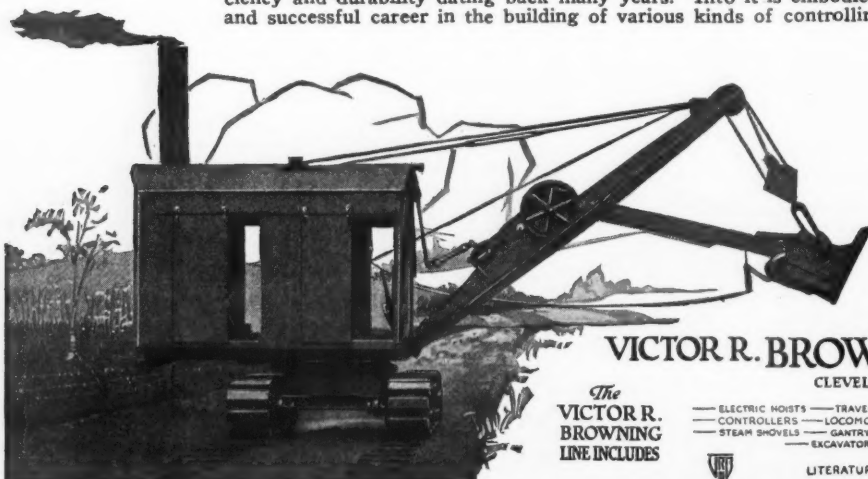
Likewise, the VRB tank crawler has demonstrated its fitness to operate in places and under soil conditions that would put an ordinary steam shovel entirely out of commission.

As regards the power plant and control mechanism, this shovel holds a reputation for uncommon efficiency and durability dating back many years. Into it is embodied the knowledge gained from a long and successful career in the building of various kinds of controlling and material handling machinery.

VRB Shovels are manufactured for either steam or electric operation in 7½ and 10-ton sizes, and dipper capacities of ¾ to 1 yard.

Copies of the new steam shovel bulletin will be sent to all interested, and those having unusual excavating or material handling problems are invited to avail themselves of the advisory service of our engineering department.

Your attention is called to the complete VRB line as mentioned below, and the ease with which you can obtain bulletins on any subject of interest.



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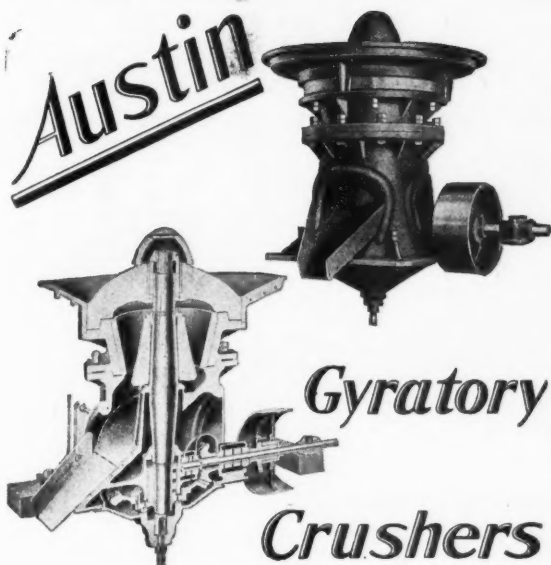


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You will find that Austin Gyratory Crushers have all the standard improvements as well as these six important exclusive features:

- 1—Automatic oiling system.
- 2—Rigid eccentric bearing in main frame.
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Remember that Austin Gyratory Crushers are made in eight sizes ranging from five to five hundred tons hourly capacity. Write us and we will advise you regarding the size best suited to your work.

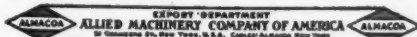


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The Allis-Chalmers organization is so interlocked that all its functions work as a unit toward obtaining maximum results. The engineering and commercial organization is divided into the following departments, each department having its own manager and engineering specialists:

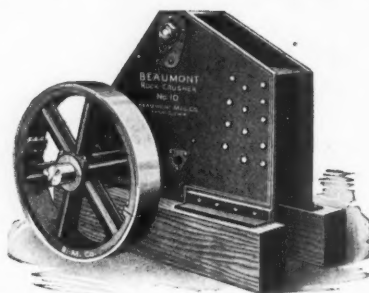
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These departments are interlocked by a standardization department, for the purpose of keeping each group of engineers in touch with developments of design, of inter-department apparatus, in order to minimize the development expense and bring about the use by all departments of the design of standard accessories.

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No. 10 Crushers—Capacity 16 to 24 Tons Per Hour

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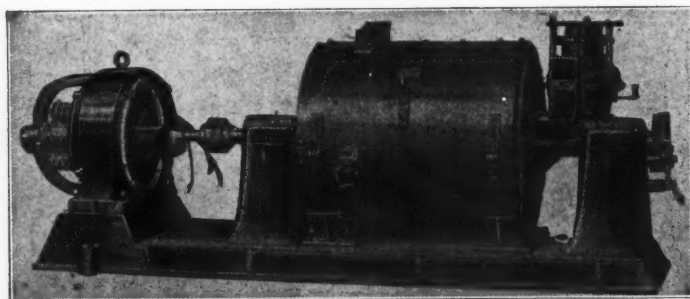
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The AERO PULVERIZER



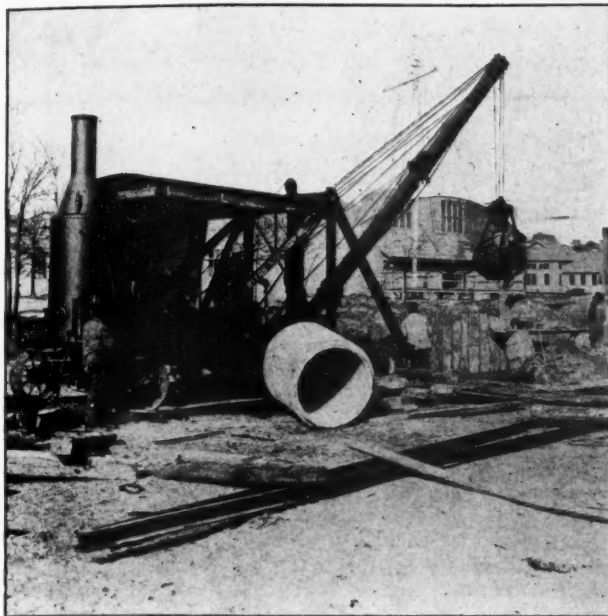
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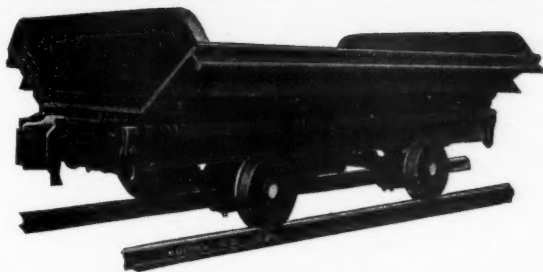
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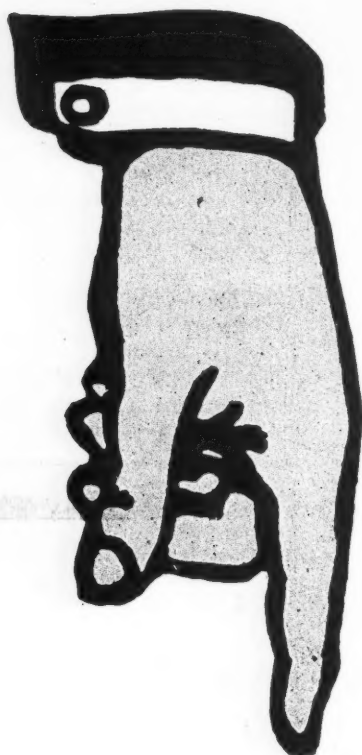
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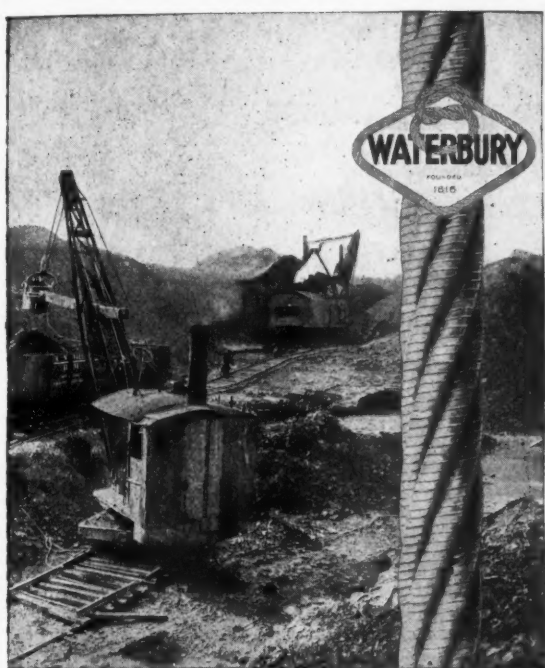
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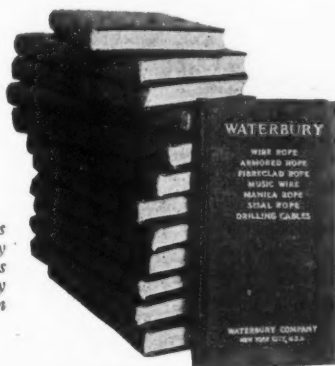
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2375-W



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Let our engineers help you. Their advice is competent—and free.



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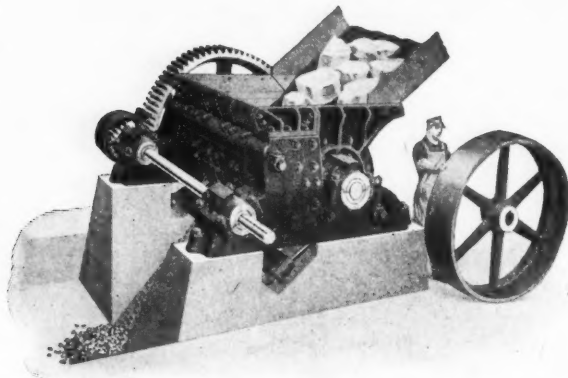
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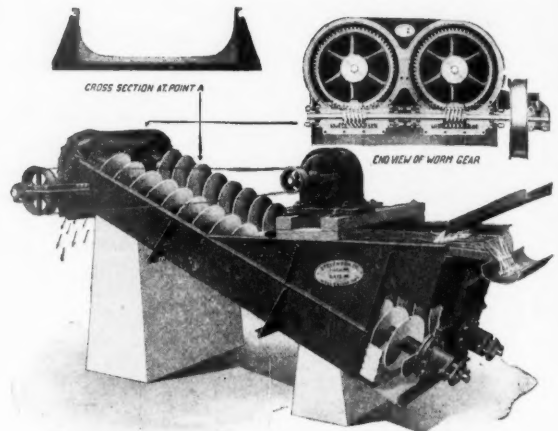
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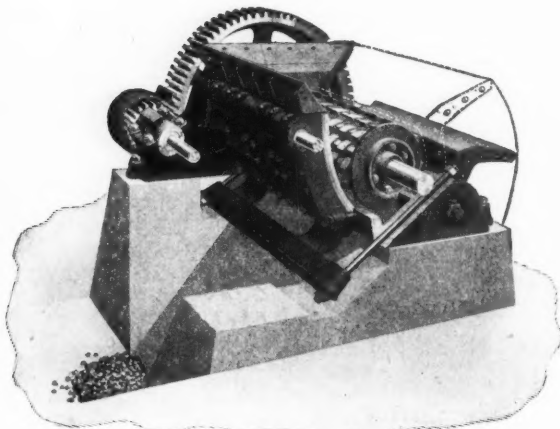
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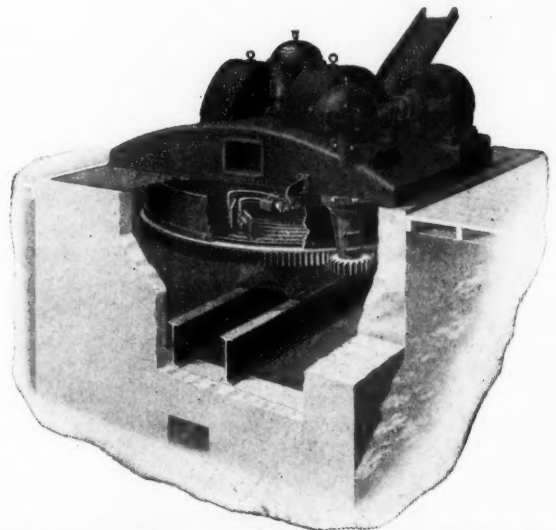
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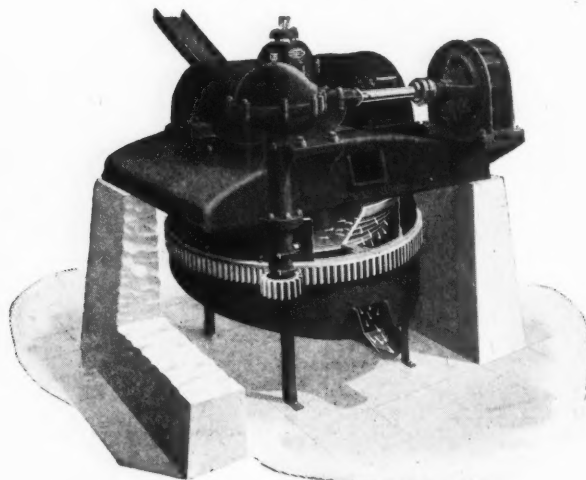
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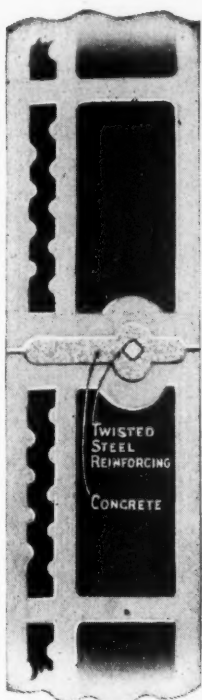
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GRINDING AND WASHING PAN, Model A302
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Vertical Cross Section of wall showing the Preston-Lansing method of reinforcing.

Nothing Better for Storing Limestone, Sand, Glass Batch Bins, etc.

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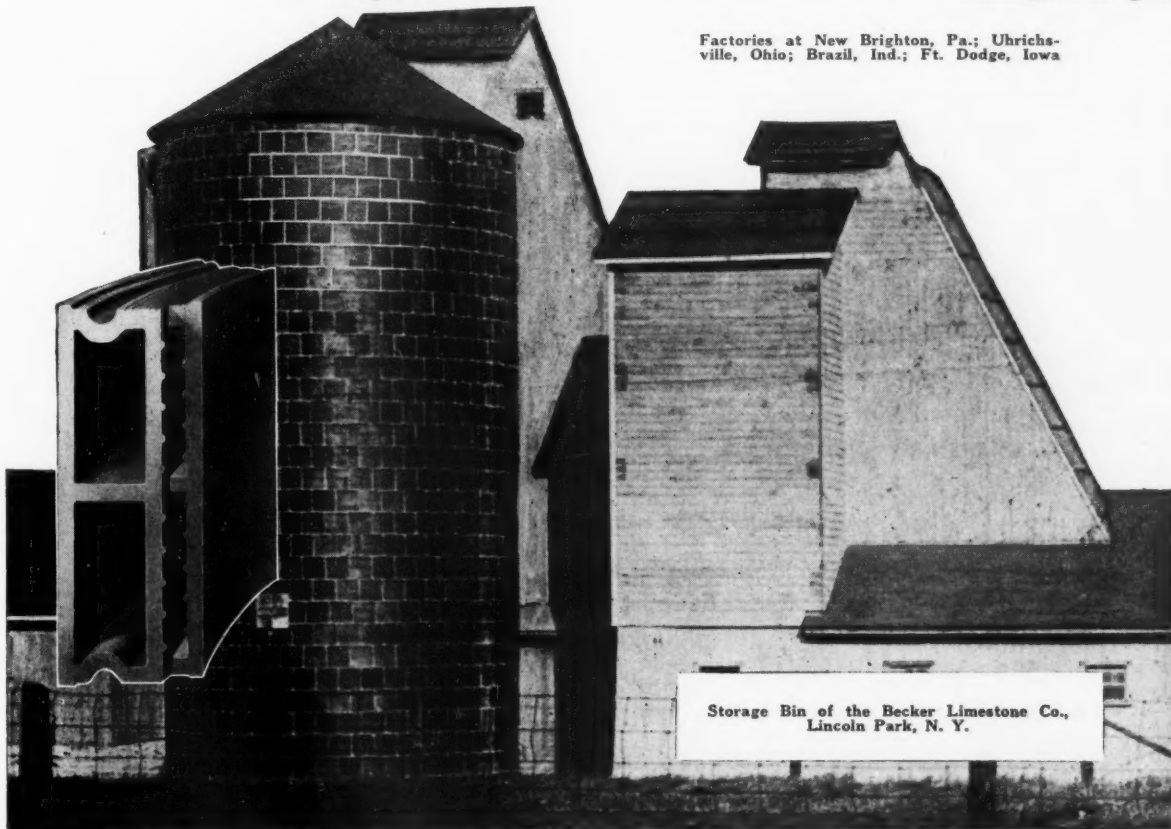
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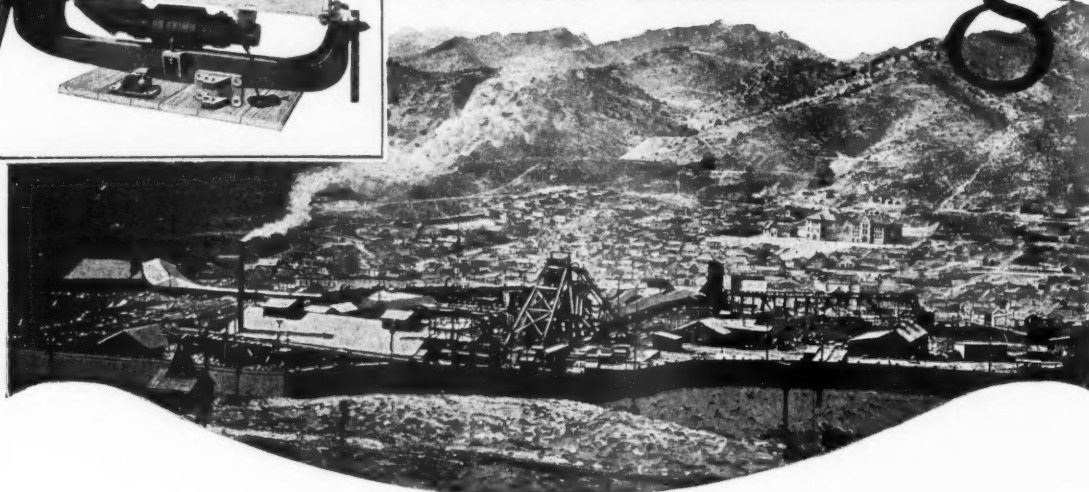
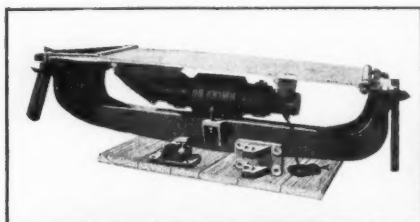
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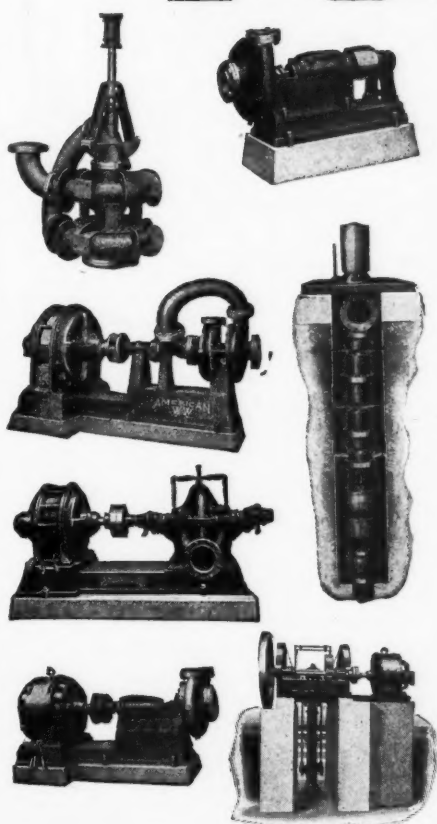


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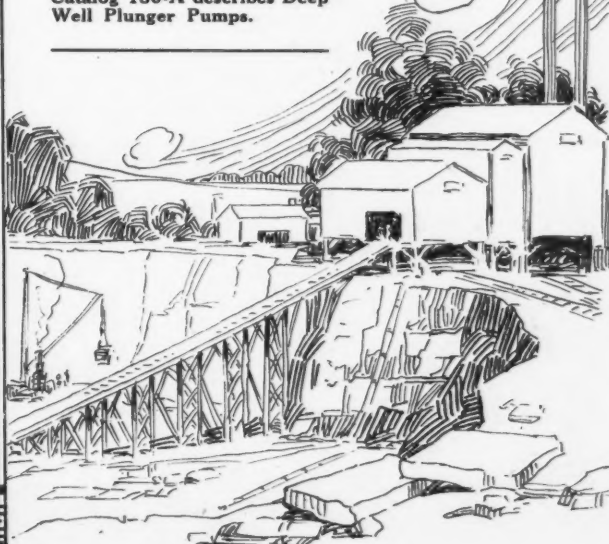
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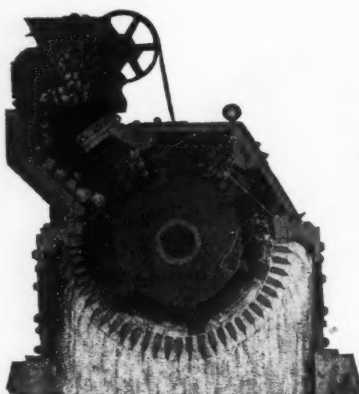


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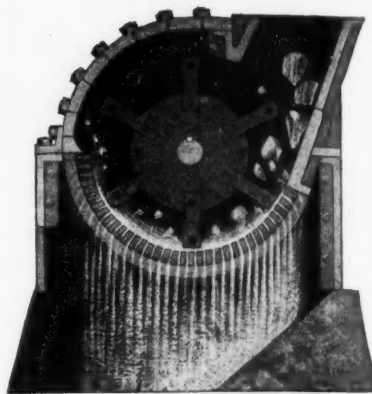
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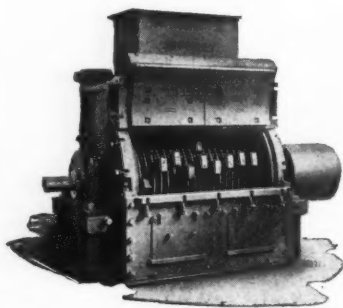


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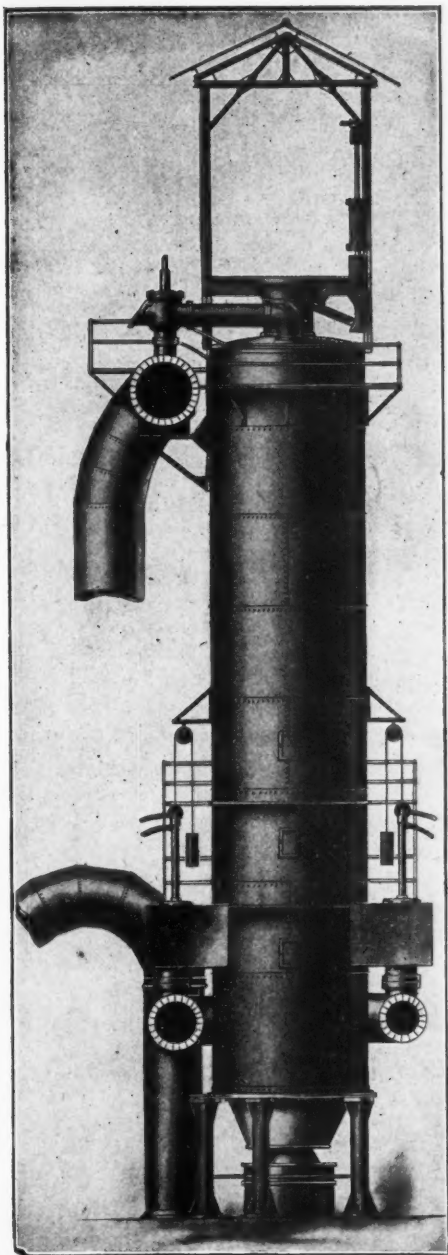
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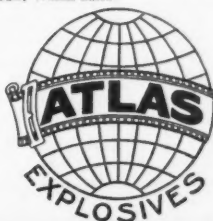
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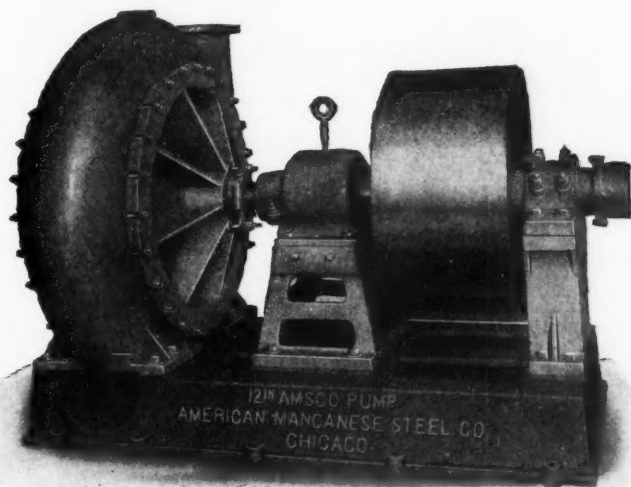
The means whereby the aggregate is transferred to the washing and screening plant is most important. No better method is available than the belt conveyor. Steadily and continuously the belt conveyor delivers material in a uniform flow to the screens.

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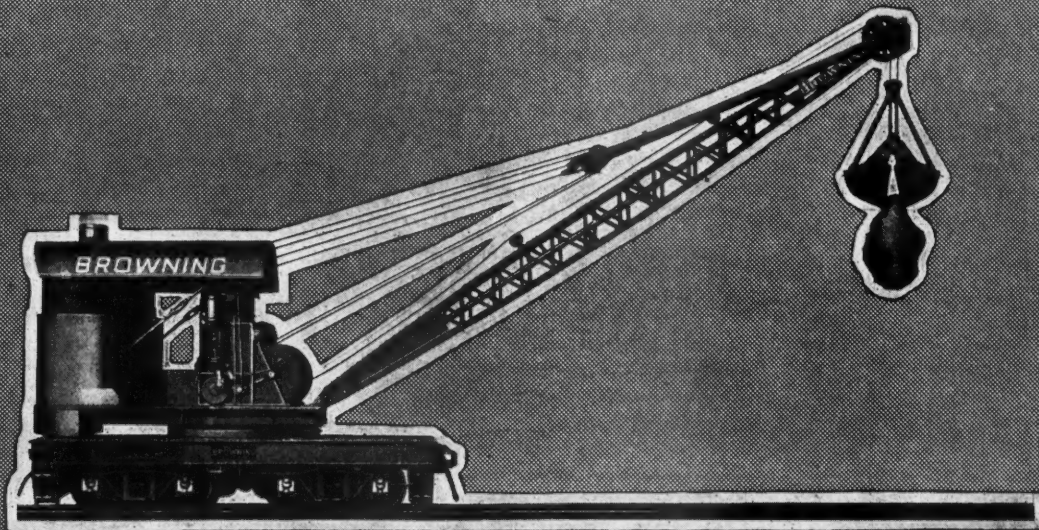
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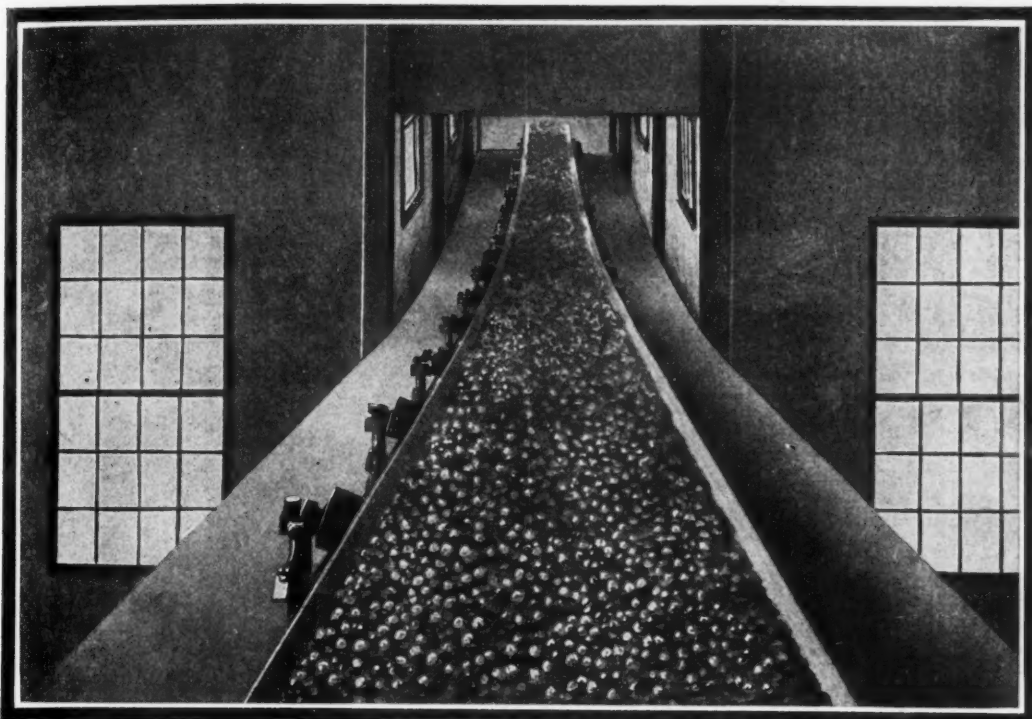
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